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WHILE day work and piece-work systems of payment for shop and engine house employees have been used almost exclusively by American railways, a few roads have experimented with and, in one or two cases, have used more or less extensively different types of premium or bonus systems. That piece-work or special methods of wage payment have proved more productive and efficient than the day work system is largely because of the fact that to successfully introduce and maintain them it has been necessary for the management to study and plan the work more carefully to eliminate useless moves and lost motion, and to closely check the output of each individual, both as to quantity and quality. As the earnings of the men under these systems are dependent on having good facilities and a convenient and plentiful supply of material,

abuses of this sort, which have been overlooked under the day work system, have been forcibly brought to the attention of the officers in charge by the workmen. Assuming that an equal amount of attention is given to these matters under the day work system, and that care is taken to study the characteristics of each man so that he can be assigned to that class of work for which he is best suited, it is doubtful if any of the systems are more efficient than day work; in fact, the results obtained on at least two roads of which we have a knowledge would seem to prove this to be true. The rather unique method of developing this truth, as outlined by B. B. Milner in the article on "Fundamentals of Wage Payment," which appears in another part of this issue, is worthy of most careful study by those interested in the problem of the payment for labor, and this is particularly true of the suggestion as to the advisability of basing the compensation on a time element only, rather than on a combination of time and rate elements, as in piece-work.

GOVERNOR MAJOR, of Missouri, in signing the train crew law in that state, not only put into effect a measure which railway officers declared would increase railway operating expenses without increasing the safety of transportation, but he gave out a statement in which he took the cheerful view that the measure would increase safety and reduce operating expenses! The railways really need more employees, the governor said, in order to operate more economically. The implication, of course, is that the governor knows more than the officers of the railways, not only about how to deal with accidents, but also about how to deal with expenses. Mr. Major is a country lawyer, who during most of his career has practised politics as much as law. He has served in the state senate, and been attorney-general of Missouri. Neither in his private practice nor in his public career has he given tokens of surpassing ability; he has had no experience in railway affairs; yet according to his statement he must have a most intimate, thorough and profound knowledge of railway operation. "The trouble in Oklahoma," said Governor Cruce in vetoing the train crew bill in that state, "is and has ever been that in dealing with public service corporations we have assumed to know more about how to operate them than those who have given the matter careful study." Governor Cruce could learn from Governor Major that in a few minutes' consultation with the legislative representative of the organized voting power of a labor brotherhood a truly great statesman can learn more about how to run a railroad than has been learned in all their years of study and experience by all the operating officers of all the railroads in the United States.

AT the meeting of the Central & Western Association of Car Service Officers in Chicago last week, a recommendation was adopted and referred to the Association of Transportation & Car Accounting Officers, that cars found to be unserviceable beyond repair shall be destroyed by the road in whose possession they are at the time, credit being given to the owner for the salvage, instead of being sent home to be scrapped. A similar proposition has been under consideration by the Master Car Builders' Association. The discussion at the meeting of the Car Service Officers left no doubt in the minds of those present that such a rule is in the interest of better railroading. W. E. Beecham, car accountant of the Chicago, Milwaukee & St. Paul, told of a St. Paul car which left that road on October 4, 1909, and arrived home on February 13, 1913, seventeen months after it had been reported in an unserviceable condition by the Central of Georgia, although a home route card had been promptly issued. When the car reached the rails of the St. Paul it was at once sent to the Milwaukee shops to be scrapped. The Central of Georgia's connection refused to accept it, and after various delays it drifted from one road to another until it finally wound its weary way to the scrap pile over more than a score of roads without hav-

ing performed any service of value to any of them. Others at the meeting related instances of "cripples" that had caused accidents not only serious in themselves, but resulting in serious delays to traffic. Last year the Master Car Builders' Association adopted a rule increasing the repair allowances, which was intended to reduce the number of bad order cars in service by making it more attractive for railways to repair foreign cars. This having been done it would seem to be a wise move to go a step farther, and provide that when cars finally get into a condition beyond repair they shall no longer be allowed to cumber the tracks and trains during the long period which is likely to be required to get them home.

WHILE the construction of the new line of the Lackawanna north of Scranton, Pa., is of much interest from the engineering standpoint, because of the very heavy construction work and the large structures involved, it is of even greater interest as illustrating the expenditures which a road with a heavy traffic and ample financial resources will make to decrease the cost of operation. The Tuckhannock viaduct is of great interest to engineers, particularly because it will be the largest structure of its type ever built, but it is of even greater interest as forming part of a plan to secure an improved line. As indicated in another column, this new line was very carefully located, the rate of increase of both freight and passenger traffic being studied and the cost of handling the present and future traffic over the present and proposed lines being very carefully compared. That this study showed that the interest on the cost of construction would be more than offset by the decrease in operating costs is evident from the authorization of the construction. The large decreases in distance, ruling grades, rise and fall, and degrees of curvature, are not an indication of poor location of the old line, but rather of the character of the country through which the line passes and of the money which is being spent to secure these improvements. It is interesting to note that these savings in distance are being made in spite of the fact that the Lackawanna is already the shortest line between Buffalo and New York. While the Lackawanna's financial position makes it more practicable for it to do work of this kind than for most roads, the expenditure of such sums as are required on the recently completed Hopatcong-Slateford cut-off, and on this more recent one, enables it to increase its already large net earnings. The work is a good example of the intensive development of railway facilities and the improvement in operating conditions which has become more marked within recent years. Improvements of this nature, the example of making which is first set by the roads which are the strongest financially, are gradually undertaken also by other roads which are not so strong, but which must meet the competition of the strong roads.

THE members of the South Dakota Railroad Commission are curious about the salaries paid to railway officers. Curiosity about other people's incomes is not confined to them. It is very common. Few of us can deny having some of it. The South Dakota commissioners are contriving means for gratifying theirs. They have ordered the railways in that state to furnish statements of the salaries of all their officers. Doubtless the South Dakota commissioners expect to find that the salaries paid are so extravagant that some judicious reductions of them would make possible large reductions in freight and passenger rates. The impression that the railways pay out a large part of their earnings in "fancy" salaries is not confined to South Dakota. If the statesmen of that and other commonwealths will turn to the statistics of the Interstate Commerce Commission for 1910, page 44, their interest in the subject will be much moderated. They will find there that the total salaries of all the officers of the railways of the United States are but 3.4 per cent. as much as the total wages paid to railway employees. If they will look farther in the same statistics they will find that

all official salaries in 1910 were but 2 per cent. of total operating expenses, and but 1.3 per cent. of total earnings. If, therefore, all official salaries were abolished, and other things remained equal, freight and passenger rates might be reduced by the large amount of 1.3 per cent. If the commissioners really want to reduce expenses let them tackle the wages of employees. The wages paid to train employees—engineers, firemen, conductors and other trainmen—in 1910 were eight and a half times as great as the salaries paid to all officers. The wages of shop employees—machinists, carpenters and other shopmen—were over six times as great as the aggregate salaries of all officers. Therefore, a 6 per cent. reduction in the wages of train employees, or a 7½ per cent. reduction in the wages of shop employees, would be equal to a 50 per cent. reduction in the salaries of all officers; and surely the commissioners would not curtail official salaries more than 50 per cent., for the average salary of general officers in 1910 was only \$3,277 a year, and of other officers only \$2,076 a year. Each of the foregoing somewhat surprising statements the South Dakota commissioners and others interested can verify by consulting the aforementioned statistics of the Interstate Commerce Commission. Obviously, if the commissioners desire to make attacks on railway expenditures that will have some perceptible tendency to reduce rates they should direct their efforts against the wages of employees, which are over 60 per cent. of railway operating expenses, as compared with but 2 per cent. for the salaries of officers. And it is confidently predicted that this is exactly what the commissioners will not do.

GOOD LOOKS AND GOOD CONDUCT; THEY SHOULD GO TOGETHER.

"JACKING UP" train and station employees is a means of discipline which is still practiced to a considerable extent. The true theory is that high standards should be prescribed and then the employees be so regularly and constantly required to square their conduct with the rules that anything like a big change in conduct, such as the jacking-up process implies, would be unnecessary and unheard of. But for various reasons the maintenance of high standards often becomes impossible, at least for a time. In real life, our theories are all the time getting buried out of sight, and we work along on what is really a low standard.

These reflections are suggested by the fact that a certain general superintendent has issued a circular calling on his trainmen to carry out the rules of courtesy, efficiency and neat appearance. The emphasis is placed on the last of the three items. It is often said that the way to have trainmen who will maintain a neat appearance is to hire men who appreciate neatness without being told. Men who like to keep their shoes clean and black, and their faces properly shaved; who wear modest neckties and do not chew either tobacco or gum, do not come to the trainmaster in droves. And if the trainmaster takes his passenger men from the freight force he has never-ending perplexities.

The standards of the superintendent, whose efforts to put his trainmen in Class A 1 are of the periodical kind, manifesting themselves only once or twice a year, hardly merit approval. Nevertheless, it is to be admitted that the time when a brakeman puts on a new uniform is a good time to get him to improve himself in other respects, and we shall therefore make no apology for preaching politeness at the time when spring suits and the spring timetables are in preparation. The essential thing is to attain to a proper standard; the time is not so important. The time to make any improvement is *now*, unless there are good reasons for delay.

The circular, however, is an ineffective means for the purpose under consideration. Assuming, at the outset, that the trainmaster loves neatness and knows the methods of securing obedience, the simple and obvious way to make a hundred trainmen neat is for him to go out among them so frequently

that disregard of his orders, because of his apparent indifference, shall be out of the question. The superintendent must face the fact that this may mean more trainmasters. Not only must the man who disciplines the brakemen (and conductors, station agents, baggage agents and porters) have time to see and talk with the men; he must have time to talk with some of them an hour at a time, privately. Many a good conductor whose uniform is discreditable could be made permanently passable, and perhaps satisfactory, by a confidential interview—and in no other way. Moreover, the trainmaster who has to take up this question after a long period of neglect of the matter must for a time give it his chief attention. An important task seldom gets done unless a competent man gives his main energies to the job. In this case the personal attention of the officer is particularly necessary because so much of the work to be done is not susceptible either of being reduced to writing or of being delegated or managed at second hand. The newness of a necktie or the age of a pair of trousers in many cases cannot be approved or disapproved except by personal inspection.

And in putting out money to pay an assistant, while the trainmaster thus neglects his other duties, the superintendent must consider the pay of the trainmaster himself. In many cases he ought to have an increase of 25 to 50 per cent.—if he fills the bill. If he is not worth that much more than the best-paid conductor or engineman, it is to be questioned whether the place is well filled.

Neatness of appearance should be dealt with, not as a thing by itself, but along with politeness and efficiency. There is a decided advantage in having a subject which is big enough to justify a serious talk, discussion or lecture. Putting these three features together accomplishes that object. As an illustration, take the case of a brakeman dealing with an ill-tempered passenger who asks an unreasonable question. To be efficient, the brakeman must be able to give a fair reason for being unable to answer the question. To be polite when the passenger is not polite will test his ability as a competent passenger trainman. To be neat in his appearance is particularly necessary in this case, because when a passenger is unreasonable in his demands it is important, as a matter of simple business policy, to leave him no justification at all for his unreasonableness. A trainmaster who has occasion to instruct a trainman in a case of this kind quite likely may find it worth while to spend a half hour on it; and as soon as the trainman has gone out he will do well to put his lecture or interview in writing, to be promulgated for the benefit of other trainmen. Why should not information of this kind be given out by means of the stereopticon? One of the most useful things done by the Safety Committee on the New York division of the Pennsylvania is the display of printed rules on the screen at evening meetings. The same process is available for any topic.

Another road recently has taken action on this subject. It is one terminating in New York, and its announcement says that "in order that the general appearance of the men on its trains shall be in keeping with the conduct required of them, provision has been made for regular inspection of their uniforms and general appearance, the aim being to make the road the best in the country in this respect." This statement, in its language, is so very like one which was made by the Pennsylvania about 35 or 40 years ago that one is tempted to observe that in the race to become "the best road in the country" this latest entrant has a severe handicap. However, there is no need of taking a very long time in the process. Great things have been done in two years, where superintendents and all concerned put their energies into the job. The word "inspection," in this announcement, serves as a reminder that on a large road an inspector not subordinate to the division superintendent can do useful work. Few trainmasters are so efficient that a spur of this kind will not benefit them. The competent trainmaster should not object to such "surprise checking" any

more than an honest conductor should object to the means taken to detect the dishonest. Moreover, the general superintendent needs the report of one man who knows the conditions on all divisions. Many things in discipline can be dealt with properly only by a man who is entirely removed from the field of possible sympathy.

Is all this worth while? Railroad managers seem, in many cases, to deem it worth while only occasionally. But every road aims to give the best service—in all that that term implies—at a few places; at least at the larger terminals. The public, however, asks for good service everywhere; and every superintendent who persistently aims to give it everywhere finds a marked satisfaction in doing so.

THE PRUSSIAN-HESSIAN STATE RAILWAYS.

THE Prussian-Hessian railway system is the largest government owned and operated system in the world. Therefore, its organization, physical structures and operation, service, rates and financial results are of unusual interest. The paper presented to the New York Railroad Club last week by Professor W. J. Cunningham, of Harvard University, an abstract of which is published elsewhere, is a very complete and satisfactory description and discussion of the Prussian-Hessian system. Professor Cunningham concludes that "state ownership of railways in Prussia is successful and that the railways are operated with reasonable efficiency." Most well informed people will agree with him. He adds, "it does not at all follow that government ownership in this country would be equally successful." Most well informed people will agree with him on that, too. As Charles Francis Adams said 30 years ago, "In applying results drawn from the experience of one country to the problems which present themselves in another, the difference of social and political habit and education should ever be borne in mind. . . . A country with a weak or unstable executive or a crude and imperfect civil service should accept with caution results achieved under a government of bureaus."

The bane of public management in democratic countries is the use of political influence to promote the interests of sections or classes whose interests are opposed to those of the public. The electoral arrangements in Prussia, as well as the railway organization, are such as to keep political influence at a minimum. The Prussian parliament has a House of Lords, which is entirely non-elective and chiefly hereditary, and a House of Representatives. In each representative district the people are divided into classes according to their wealth; an arrangement under which 15 per cent. of the people in numbers have two-thirds of the political power. The railway employees belong to that 85 per cent. of the people who have only one-third of the effective voting power. Besides, they are not allowed to organize, and it is only by organization that they could make themselves felt. The minister of public works, the head of the railway administration, is appointed by the kaiser for life, and, therefore, parliament could not turn him out of office if it wanted to. Also, the railway employees are recruited from the army, where they have learned to submit to discipline, and are subject to a discipline on the railways hardly less rigorous than that in the army. Another important point is that the Prussian state mileage is not one-tenth that of the railways of the United States, and is spread over a territory only half the size of Texas.

The Prussian freight service, all things considered, probably is not so good as that of either England, France or the United States. The movement of goods is relatively slow, the regulations to prevent claims stringent, the demurrage rules very strict and often made more so in periods of car shortage; and car shortages are large and not infrequent. While the railways of England and the United States give shippers 48 hours free time in which to unload cars, those of Prussia never give more than 24 hours, usually not more than 12, and often reduce the

time below this. The demurrage rates, allowing for the differences in the capacities of cars, are substantially higher than in England, and from three to five times as high as in the United States.

The Prussian passenger service will compare with any in the world. The trains are not so fast as in England, France or the eastern part of the United States, but are more regularly on time. In frequency of passenger train service the British roads are first and the Prussian roads second. The Prussian trains, and especially their fourth class compartments, are more likely to be crowded than those of any other leading railways.

Professor Cunningham refers to the remarkably good record of the Prussian lines for accidents. They are superior in this respect to the railways of the United States. But this cannot be attributed to government management, nor indeed to the Prussian scheme of operation, for the record of the English roads and of the five large French private roads, are fully as good as that of the Prussian roads, while the record of the French state railways is very bad. In the year ended June 30, 1910, the Prussian-Hessian roads made the remarkable record of killing only two passengers in collisions and derailments, but in the calendar year 1909, the British roads, with a larger mileage and more trains, made the still more remarkable record of killing only one passenger in a train accident. The accident records of the British, French and German roads are so much better than that of the railways of the United States for the following reasons: First, their physical properties are in safer condition chiefly because a great deal more money has been invested in them. Second, the railway employees in both countries are more careful, discipline being rigorously enforced by the management and governments. As Professor Cunningham points out, in Prussia in 1910 132 employees were prosecuted criminally for infractions of the rules, 81 being given court sentences. Third, in Europe there are stringent laws against trespassing on railway property, which are enforced. The possible trespassers on the railways of a country include its entire population. The population of the United States is somewhat over twice that of Prussia-Hesse, while the number of trespassers killed on our railways is about 28 times as great as on the railways of Prussia-Hesse.

The average passenger rate of the Prussian-Hessian railways is only 46 per cent. of that in the United States and is less than that of any other railways in the world except the state railways of Belgium. The average rate is not so low, as Professor Cunningham shows, because the absolute rates are so low, but because 89 per cent. of the passengers carried travel on the extremely low third and fourth class rates, the service for which is inferior, while only 10 per cent. travel second class and only a trifling number first class. Furthermore, the density of passenger traffic in Prussia is over five times as great as in the United States, and three and a half times as great as in Interstate Commerce Commission Group 2. On the five large French private lines, whose density of passenger traffic is about two-thirds that of the Prussian roads, the average passenger revenue per mile is from 1.11 cents to 1.25 cents. The average rate per ton per mile in Prussia is much higher than in the United States, and after full allowances for differences in conditions, it is relatively higher. The density of freight traffic in Prussia in 1910 was 1,150,490 ton miles per mile, and on the five French private roads only 819,055 ton miles per mile; and the average rate per ton per mile in Prussia was 1.248 cents, and on the French private roads from 1.18 to 1.46 cents.

It is generally considered that the Prussian roads are the most economically operated railways in Europe. It is very questionable if they are as economically operated as the five large French privately owned roads, with which they may most fairly be compared. The average passenger journey in Prussia in 1910 was 14 miles and on the French private roads 22 miles. The average passenger density of the Prussian-Hessian roads was 693,921 passenger miles, and that of the French private

roads 436,000 passenger miles. The average haul per ton on the Prussian roads was 68 miles, and on the French private roads 96 miles. Both the passenger and the freight hauls in Prussia are shorter, but this disadvantage is offset by the greater densities of both freight and passenger traffic. While the total units of freight and passenger traffic per mile on the French private roads were 68 per cent. as great as on the Prussian roads, their operating expenses per mile were only 60 per cent. as great, the operating expenses per mile of the Prussian roads being \$14,866 and those of the French private roads \$8,889. The operating ratio of the French private roads was 55½ per cent., while that of the Prussian-Hessian state roads was 67.27.

As Professor Cunningham points out, the financial results on the Prussian-Hessian roads are very good, and they were able in 1910 to turn about \$50,000,000 into the public treasury. This is about 9½ per cent. of their gross earnings—in other words, of what they collected from the public in rates. The taxes paid by the railways of the United States in the same year amounted to \$99,423,112, or 3.7 per cent. of their gross earnings. The Prussian railways are the only government railways that regularly have net earnings in excess of the interest on their indebtedness.

While, as Professor Cunningham says, the experience of Prussia is not an argument for government ownership in the United States, it does teach one important lesson. Government railway management in Prussia is efficient because it is backed by an efficient government, is not subject to political influence and usually puts national above class or sectional considerations. Any government that is to be successful in the operation of railways must follow the example set by Prussia in these respects. No democratic government ever has done this, and it is questionable if any ever will or can do so.

NEW BOOKS.

The Earning Power of Railroads. By Floyd W. Mundy. 528 pages. The Guenther Publishing Company, 18 Broadway, New York. Price, \$2.

The 1913 edition of this manual, like the previous editions, gives a large range of statistics showing mileage, capitalization, tonnage, earnings, etc., of the American railroads in comparative tables covering 10 year periods. The value of the book lies quite largely in the wide scope of the figures given. In addition to the figures for certain physical characteristics of the roads and earnings there are tables showing dividend records, bonds outstanding and in addition a short history of each property. The author is a member of James H. Oliphant & Co., New York.

In making use of the comparative tables for the ten year period, it should be borne in mind that since 1907 the railroads have followed the methods of accounting prescribed by the Interstate Commerce Commission, which was quite different in many instances from the methods in use previous to that time. Comparisons, therefore, between 1912 figures and 1902 are not always accurate. If this fact is not lost sight of then, the ten year tables are very handy and serve a useful purpose.

Engineer's Handbook on Patents. By William Macomber. Bound in flexible leather, 288 pages, 4½ in. x 7 in. Published by Little, Brown & Company, 34 Beacon street, Boston, Mass. Price, \$2.50.

The author is a lecturer on the law of patents in the Cornell University law school, and the book is intended as a text book rather than a treatise on the subject. It includes chapters on: What is a patent, the nature of an invention, what is patentable, patentable novelty, the obtaining of patents, claim construction, infringement, patent litigation, and property rights. The book is written in clear and concise language, with a minimum of legal phraseology, and is accompanied by an extensive index for ready reference. Intended especially for engineers, it is equally valuable for inventors and manufacturers.

THE PRUSSIAN-HESSIAN STATE RAILWAYS.*

An Instructive Description and Discussion of Their
Management, Service, Rates and Financial Results.

By W. J. CUNNINGHAM,

Assistant Professor, of Transportation, Harvard University.

Altogether there are about 34,500 miles of state-owned railways, and 2,200 miles of private-owned railways, in Germany. Of the state-owned mileage Prussia has 23,335, or slightly more than two-thirds. Bavaria comes next with 14.1 per cent. Then comes Saxony with 5.1 per cent.; then respectively Alsace-Lorraine with 3.6 per cent.; Baden with 3.1 per cent.; Mecklenburg with 2.0 per cent.; and Oldenburg with 1.2 per cent. In Prussia-Hesse, the private-owned mileage is 6 per cent. of total. The private railways, however, are comparatively unimportant and are controlled by the government almost as completely as the railways of the states. They are obliged not only to conform to the state traffic regulations but as well to adopt the rules and standards set by the government for the same class of state-owned railways.

STATE OWNERSHIP.

If we may accept as true the statements of the early advocates of state ownership for all of the railways, the greed, selfishness and arbitrariness of the private railway companies were the causes which led to their ultimate absorption by the states. The results, however, were not unprofitable to the shareholders.† Widespread complaints crystalized into a common demand for government ownership, and the movement had a peerless leader in Bismarck. The causes of dissatisfaction then remind us of those now advanced so hysterically by those in New England who wish to bring about state ownership of the Boston & Maine.

In order to summarize the reasons which impelled Germany to give up private ownership, we can hardly do better than to quote from Bismarck's speeches in Parliament.‡ He protested that the railways must not be allowed to act the part of Providence and alter the natural laws of supply and demand; they must not be allowed to dominate trade and industry; they must not be allowed to grant preferential treatment and discriminate in favor of the large shipper at the expense of the small trader; they must not be allowed to overcharge on non-competitive traffic in order to recoup themselves for losses on competitive business; they must not be allowed to grant passes and rebates to the favored few. In brief, the arbitrariness, the egotism, and the discrimination of individuals must be checked. Instead, a policy must be substituted which under state ownership should bring about uniformity of charges, equality of service, protection of public interests, and the establishment of a just, diligent and able railway administration actuated solely by considerations of the general good of the country.

Many reasons other than those quoted from Bismarck's speeches are given as the real object of government ownership. It is commonly believed that military reasons were dominant, that the government in its consistent policy of preparedness for war desired absolute control of all transportation facilities. Taking the view of economists of high standing in Germany, it appears that the real and controlling reason was economic. The object was not to make the railways a means of state power, nor of revenue, but to make them a means of traffic subservient to the economic interests of the nation; to substi-

tute the state for private enterprise as the guardian of the commercial interests of the community.**

It is proper to add that when the nationalization project was before Parliament, Bismarck promised substantial reductions in rates. These promises, no doubt, were made in good faith, but subsequent political exigencies have caused their repudiation. The railways of Prussia as now administered, make large profits, and they apparently could afford to place freight rates on a lower basis and still continue to take care of renewals and betterments. They continue to earn a large surplus and every year they turn over a substantial part of it to the state to be used for the general budget. In the year 1910, the net earnings in Prussia were 6.48 per cent. on the capital investment of \$114,000 per mile of line (nearly double our average capitalization) and out of \$170,000,000 net revenue, \$50,000,000 was devoted to other than railway purposes. The patrons of the railways, therefore, particularly the freight shippers, have reason to complain that they are taxed for the benefit of the community at large.

ORGANIZATION.

At the head of the railway administration of Prussia, is the minister of public works, who is appointed by and may be removed only by the king. Changes in this office are very infrequent. The minister and his councillors correspond roughly to our board of directors or executive committee and chairman; but the several councillors are railway experts, and each devotes his attention to the department in which he has specialized.

The ministry deals only with general matters of policy and standards. The active administration is left to the local directorates, of which there are 21. The average mileage per directorate is 1,116. At the head of each directorate is a president, who reports to the minister of public works. The president of a directorate corresponds in a general way to our general manager, but he has control over every department on his division, including not only maintenance and operation, but also traffic, accounting, finance and construction. It will be seen, therefore, that the Prussian operating unit—the directorate—is the highest type of the divisional system of organization. Below the president the organization becomes departmental, and the lines of authority and responsibility are tightly drawn.

While the principle of local autonomy in the operating of each directorate is carefully guarded, it has been found advantageous to concentrate a few functions exclusively in one of the several directorates, the one so selected to act in that particular matter for all other directorates. Besides, there is a central office in Berlin, which is rated as a directorate (making 22 in all) and attends to certain specified activities for the system as a whole. In some respects the president of the central office resembles our superintendent of transportation, but the former has wider jurisdiction, including that of our purchasing agent.

Associated with the administration are two kinds of advisory or consulting bodies: (1) advisory councils, local and central, established by law; and (2) voluntary traffic and operating unions. The advisory councils are composed of representatives of the government, and delegates from boards of trade, industry and agriculture, as well as representatives of the railway administration. The administration is obliged to consult with

*An abstract of a paper presented before the New York Railroad Club, April 18, 1913. Prof. Cunningham spent three months in the summer of 1912 in Germany, and his discussion is based on personal observations and a study of official publications.

†In nearly every case the states paid more for the railways than the sums for which they were capitalized. In Prussia this excess averaged about 8 per cent. over the capitalization. Payments were made in 3 per cent., 3½ per cent. and 4 per cent. government bonds.

‡Contemporary Review, February, 1907, pp. 174-192.

**Professor Hermann Schumacher before Royal Economic Society, London, January, 1912.

these advisory councils on all matters affecting rates or public service. They have no actual power to compel the railway administration to accept their recommendations, but, like the findings of the Massachusetts Railroad Commission, their recommendations are equivalent to commands. The jealousies of sections usually prevent any tinkering with tariffs, even when the administration might be willing to make a reduction which would benefit certain communities. To illustrate, the German policy would not permit California to compete on equal terms with Florida for the New York fruit market. Florida's natural advantage in being nearer the New York market would be guarded.

The advisory councils, on the whole, are to be commended, both in their negative and positive results. Through them the industrial, agricultural, and trade bodies are the arbiters of their own interests in transportation, and all persons affected by railway rates and rules of service have an opportunity to be heard before any change can be made in existing tariffs or regulations.

The American railroad man who visits behind the scenes on the Prussian railways is struck by the absolute impersonality of the organization. Authority flows from the office, and respect is accorded to the office, rather than to the man who happens to fill it. The personality of an official, which is so important here, has practically no play under the Prussian organization. Letters or instructions emanate from the directorate, and may bear the signature of any one of the officials, but in the name of the directorate.

DISCIPLINE.

It is well known that practically all of the railway employees of Prussia have served in the army. When they enter the railway ranks from the army, certain credits are allowed for their military service, and certain positions are reserved for army men. This military experience shows its influence on their deportment and discipline in railway service. There is a noticeable orderliness and precision about everything connected with German railways. In respect for authority and strict observance of the rules, the German railway employee has no superior. The traveler will not fail to notice the red-capped station master standing at attention on the station platform as the train passes through each station. He will also find the senior signalman, gatemen, and other employees connected with train service always in evidence, standing like sentries as the train passes. The operating official, while riding over the line, can thus take a census of all employees in positions of responsibility. When he alights at a station his rank is at once recognized. The station master immediately salutes and gives a verbal report of the situation at his station. If the official goes into a signal tower, the signalman in charge salutes and reports. If he goes into an engine house, the foreman salutes and gives a brief report of the work in progress.

The formation of railway labor unions in Prussia is forbidden by the railway administration. The employees have associations, but inasmuch as the railway officers are *ex officio* members, and take a fairly active part in the proceedings, these associations bear little resemblance to our railway brotherhoods.

The high order of discipline and rigid observance of rules which follows their system of ample and constant supervision bears fruit in their remarkable immunity from train accident, and in the small number of passengers and employees killed or injured. Differences in the manner of compiling accident statistics make comparisons with this country difficult. It is possible, however, to make a comparison of injuries in train collisions and derailments, since the classification is the same in both countries and the statistics are made up on the same basis. In 1910, only 2 passengers lost their lives in collisions and derailments on Prussian railways. In that year they handled 1,083,882,279 passengers. In the same year the United States, with ten times the railway mileage, transported 971,683,199 passengers (112 million less than Prussia). But it must

be borne in mind that our passengers traveled farther. In Prussia the average passenger journey is 14 miles; here it is 33 miles. Consequently our railways produced more passenger miles, although they handled a smaller number of passengers. Looking at it one way, it is fair to the United States to compare injuries to passengers on a basis of passenger miles. Viewing it from another angle, it may be said that collisions and derailments will tend to vary with the train miles rather than with the number of passengers. We will make the comparison on the two bases:

PASSENGERS AND EMPLOYEES KILLED AND INJURED IN COLLISIONS AND DERAILMENTS, 1910.

Item.	Prussia-Hesse.	United States.
Passengers carried one mile (millions).....	15,688	32,338
Total revenue and non-revenue train miles (thousands).....	298,584	1,276,025
Passengers killed in collisions and derailments.....	2	127
Passengers injured in collisions and derailments.....	349	6,499
Employees killed in collisions and derailments.....	13	608
Employees injured in collisions and derailments.....	162	5,201
Passenger miles per passenger killed (millions).....	7,844	255
Passenger miles per passenger injured (millions).....	45	5
Total train miles per passenger killed (thousands).....	149,292	10,048
Total train miles per passenger injured (thousands).....	856	196
Total train miles per employee killed (thousands).....	22,968	2,099
Total train miles per employee injured (thousands).....	1,843	245

Attention is again drawn to the fact that the foregoing tabulation includes only the injuries in *collision and derailments*. Injuries in other train accidents, falling from moving cars, highway crossing collisions, trespassing fatalities, suicides, etc., are not included in the figures for either country. Those for this country are sufficiently familiar to us. The small number of accidents to trespassers is noticeable.* In Prussia the laws prohibiting trespassing are strictly enforced and the railway right of way is carefully guarded. Those who trespass assume a high risk of arrest, since the tracks are well patrolled. All persons detected are arrested, fined or imprisoned. The fact that 14 trespassers are killed daily on the railways of the United States,† although given wide publicity, has thus far made little impression on our city and county authorities.

The poor accident showing in this country is largely due to the inherent tendency of the American railroad man to take chances. In Prussia, the railway employee is more deliberate in action, and his military training gives him greater respect for the rules. It may be, too, that the methods there employed to investigate accidents and mete out punishment to the careless, have a direct bearing on their remarkable immunity from casualty. Discipline for infraction of the rules is severe. Guilty employees are not only reprimanded, suspended, fined, or dismissed, but in flagrant cases they are imprisoned. In 1910, there were 132 cases of criminal prosecution, and 81 employees were given court sentences.

COMPENSATION OF EMPLOYEES.

Turning now to the question of salaries and wages, it is interesting to note that in 1910 the average yearly wages of the Prussian railway forces, including all officials as well as workmen, was only \$380 per employee. The official statistics show that the average number of "rest days" per month was 3.44 for all employees whose duties require any Sunday work. This gives an average of 324 working days, and an average daily compensation of \$1.17. The writer has not sufficient information to hazard a guess as to how much more should be added to that average to allow for the supplementary allowances. He believes, however, that it is within the bounds of reasonable accuracy to say that the gross income of the Prussian employee is just about one-half the average wages of the American railway man. The general average for this country in 1910 is given by the Interstate Commerce Commission as \$2.14 per day, excluding officials, but the accuracy of the figure is open to question because of differences in methods employed by different railways in compiling the basic figures. It must be remembered, however, in making comparisons between the two countries, that the cost

*Killed 180; injured 145.

†In Prussia, one trespasser was killed every second day.

of living is considerably lower in Prussia, and the purchasing power of the dollar is correspondingly greater.

An examination of the list of salaries, etc., shows that the financial reward for the officials is striking in its moderation. The presidents of the various directorates receive but \$2,900 per year and a free dwelling. The honor and prestige which go with the position are rated high and evidently compensate for the lack of salary. His assistants, in addition to free dwellings, are paid \$1,000 for the first three years, and a small amount is added every three years until they reach the maximum of \$1,720, after 18 years of service.

On a road mileage basis Prussia has 21 employees per mile. The average in group 2 of this country is 16 per mile, and in the whole United States 7 per mile.

PHYSICAL CHARACTERISTICS.

Turning now to a consideration of the physical characteristics of the Prussian railway system as it is today, we will first examine its trackage facilities. Serving as it does such a thickly populated district (about 300 per square mile) and having such dense traffic (as will be apparent from the figures to be presented later) we naturally expect to find the lines well equipped with multiple running tracks. Nearly one-half of the system has two or more tracks. In group 2 of the United States (comprising the railways of New York, New Jersey, Pennsylvania, Maryland and Delaware) the territory in this country which comes nearest to resembling Prussia in population and railway development, the percentage of two or more running tracks is practically the same as in Prussia, but in the United States as a whole, only 10.5 per cent. of the railways have two or more tracks. The comparative figures which follow may be of interest:

TRACK DENSITY IN PRUSSIA-HESSE AND UNITED STATES, 1910.

	Prussia-Hesse.		Group 2: U. S. A.		United States.	
	Track miles.	Per Ct. of road miles.	Track miles.	Per Ct. of road miles.	Track miles.	Per Ct. of road miles.
Single track	23,364	100.0	23,815	100.0	240,831	100.0
Second track	9,807	42.1	7,609	32.0	21,659	9.0
Third track	44	0.2	1,284	5.4	2,206	0.9
4 or more tracks.....	119	0.5	941	4.0	1,489	0.6
Yards and sidings.....	15,287	65.4	16,101	67.6	85,582	35.5
Total trackage	48,621	208.2	49,750	209.0	351,767	146.0

The Prussian roadbed, particularly on the main lines, is well built and well maintained. Steel rail, of design similar to ours, and weighing 91 lbs. per yard is now standard, but the greater part of the mileage still has the lighter rail, averaging between 70 and 75 lbs. per yard. Crushed stone and gravel predominate as ballast, the former being generally used on the important lines. Their standard roadway section for single track main lines calls for a width of 19 ft. across the top of the subgrade, 9 in. of ballast, and 13 ft. across the top of the ballast. Multiple tracks are spaced 11½ ft. on centers.** Tie plates are used on all lines of heavy traffic and screw spikes are standard everywhere. About 31 per cent. of the mileage is laid with metal ties of the inverted trough type, and practically all wood ties are creosoted. The average spacing of ties is 28 in. from center to center, and their length runs from 9 ft. on main lines to 7½ and 8 ft. on branch lines. The use of the metal tie has not become a settled policy and there is much discussion in Germany as to whether it is really superior to the treated wood tie when all factors are considered.

Station, siding and yard facilities at many points, particularly near the frontiers, seem entirely too generous for the regular freight and passenger traffic. The explanation lies in the possible need of these facilities for the handling of troops and military supplies. All freight cars are stenciled to show capacity not only for freight but also for men and horses. A timetable for military operation is ready for use on short notice, and in the event of war, the trains for troops, horses, guns and supplies would take precedence over all other traffic.

The passenger stations in the cities, particularly the stations

built within the last 15 years, are imposing in design, generous in size and trackage facilities, and well equipped to take care of the needs and comfort of the maximum traffic. The Hamburg main station is a good example. Those at Cologne, Frankfurt, Darmstadt and Halle are notable. The latest and most magnificent, as well as the largest station in Europe, has just been completed in Leipsic at a total cost of upwards of \$40,000,000. It has 22 tracks under one train shed. In Berlin there are several large stations to serve the different lines radiating therefrom, but there is no central or union station. All the Berlin passenger stations are connected by the north and south rings—belt lines which carry an enormous passenger traffic. Conditions on these belt lines, which intersect both the business and residential sections, seem ideal for electric operation, but the service is still steam operated, although electrification has been under consideration for several years.

In the freight classification yards we find occasional use of the "hump" in switching. A good example is seen at Wustermark, near Berlin. There are separate humps for each direction, and besides the well laid out yards, there is an admirably designed freight transfer station of concrete construction. The light cars are very easily handled over the hump. The writer observed a 48 car train classified in 12 minutes, each cut averaging about two cars.

The frequency of fixed signals and signal cabins is noticeable. All are of the manual or manual control type. The Germans do not take kindly to automatic signals. They prefer to rely upon the signalman. When asked why they do not consider the adoption of the automatic signal, which has been developed here to such a high degree of perfection, they usually turn the conversation to train accidents and inquire why it is that America has such an unenviable record in that respect.

The official statistics show that Prussia has 40,916 home signals (1.7 per mile of line) and nearly 15,000 distant signals. There is one interlocking cabin for every 5¾ miles. Grouping together all signal towers, cabins, and block stations, there is one for every one-half mile of line. On 2,800 miles of line where speed restrictions apply, automatic speed recording devices are installed alongside the track, and the records are carefully checked to insure strict adherence to the rules.

LOCOMOTIVES.

The Prussian passenger locomotive on through trains is considerably lighter than ours, but there is not as much difference as is generally supposed. In that class of service the Atlantic and 10-wheel type predominate. A large proportion of all locomotives is of the compound type. Germany is the home of the superheater and nearly all engines are equipped with the device, as well as feedwater heaters, draft regulators, screw reversing gear, and other appliances which are not common here. The interior of the cab, especially in those equipped also with cab signals, seems somewhat complicated to the American observer.

The tank locomotive, which is comparatively light, appears to be the favorite in local passenger service. Freight locomotives vary in size, but most of them are little more than half the size of our freight locomotive. With the small freight cars and light grades of the main lines, the length rather than the weight of the train is the controlling feature, and heavy engines are not needed. In southern Germany, however, where the grades are heavier, there are many locomotives which in weight and power compare favorably with those of the American consolidation type.

In 1910, Prussia had 19,670 locomotives of all kinds. This is an average of 84 locomotives per 100 miles of line. The average for the United States in the same year was 25, but in group 2 it was 57. The average weight of all Prussian locomotives, including tender, was 59 tons. For the United States, the average weight was 73 tons, exclusive of tender. Without knowledge of the weight of the tender, and the proportion of tank locomotives in each country, it is impossible to make an

**The Prussian car is narrower than the American car.

exact comparison, but in the judgment of the writer, it is close to the mark to say that the Prussian passenger locomotive is about two-thirds the size of the American passenger locomotive, and the Prussian freight locomotive about one-half the size of ours.

The cost of maintaining locomotives in Prussia in 1910 averaged 4.8 cents per mile, which indicates commendable efficiency even when due allowance is made for their small size. Failures are infrequent and the locomotives generally have the appearance of being well maintained. The Prussian policy differs from ours in that they expect and obtain a comparatively long life from their locomotives. The average life of all locomotives in 1910 was 10.2 years. One was 40 years old; 10 were 37 years old; 9 were 35 years old; 10 were 33 years old. One-quarter of the entire equipment ranged from 10 to 20 years in service; 45 per cent. ran from 5 to 10 years; and 22 per cent. had an average age of less than 5 years. The average mileage per locomotive in 1910 was 25,600. The same average for this country was approximately 29,100.

The Prussian statistics showing the performance of locomotives (and in fact all of their statistics) are remarkably complete. Among other things they give the number of days all locomotives were in service, the per cent. of time in actual use, and the per cent. of time they were in the shops for repairs. They were actually used in train service 32.79 per cent. of their time; 18.91 per cent. of their time was spent in the shops for repairs; leaving 48.3 per cent. of the time when they were idle in or near the engine house. The high proportion of time idle is accounted for by their policy of single crewing. When not single-crewed, it is the general practice to assign one engine to two crews. Enginemen are required to do much of the light running repairs themselves, and on single-crewed engines the fireman is required to report at the engine house two hours in advance of leaving time, in which to kindle the fire and get up steam. At the end of the trip it is his duty to clean the fire and do other work which here is done by the engine house forces.

Careful attention is paid to fuel economy, and premiums are paid to engine crews for economic results. The writer did not personally secure any detailed statistics on this feature of operation, but the figures given recently in the *Railway Age Gazette* (January 3, 1913) by H. W. Jacobs, throw light on the subject. Mr. Jacobs compares the performance on a division in Prussia with a division of an American railway with somewhat similar service.

PASSENGER CARS.

The passenger cars of Prussia conform to the usual European design of separate compartments. The older type, used exclusively in suburban and local service, has doors on each side of each compartment, and when the train is in motion the only means of communication between cars or between compartments of different classes is by the running board on the outside of the car. This, of course, is used only by the trainmen and by them rarely.

Altogether there are 51,703 passenger, baggage and mail cars in Prussia, or 222 per 100 miles of line. In group 2 of the United States the passenger train car density is 52; in the United States as a whole, 20. Of the Prussian equipment 68 per cent. have side entrances and 32 per cent. have end doors and vestibules. The latter are used almost exclusively in through trains. More than half of the passenger cars have 3 axles, one under each end of the car and one under the center; 33 per cent. have but two axles; and the remaining 13 per cent. are of the modern type for the best trains and have four or six axles. Averaging all passenger train cars, the number of axles per car is 2.72. The older type of two or three axle car with side doors is very small and weighs about 20 tons. The modern corridor car, with four or six axles, is 60 ft. long, 9½ ft. wide, and weighs from 45 to 55 tons. The capacity of the car depends upon the classification of the compartments. There are

four classes. First-class compartments seat four passengers (two per seat); second-class, six passengers; third-class, eight passengers. Fourth-class compartments are much larger, but only a limited number of seats are provided for the first comers—the other passengers stand. As a rule, those who stand in fourth-class compartments far outnumber the fortunate few with seats.

First-class compartments correspond with our parlor cars; second-class cars are as comfortable as our best modern coaches; third-class accommodations are considerably worse than our poorest and oldest day coach, or perhaps a shade better than our colonist car. The seats in third-class cars are not upholstered. With four passengers per seat all occupants are crowded. We have nothing that compares with fourth-class. Very few passengers use first-class compartments. Most of the well-to-do and tourists travel second-class. A traveler who wishes to economize may ride third-class for short distances without much discomfort, if the train is not crowded, but he must be in hard straits indeed to economize by riding in fourth-class cars. Nevertheless, as will be pointed out later, 46 out of every 100 passengers use fourth-class accommodations.

FREIGHT CARS.

The average capacity of all Prussian freight cars in 1910 was 15.7 tons. Practically all of them have but two axles. Only one-third are fitted with brakes of any kind and only a very few of these with air brakes.* Automatic couplers have not been adopted, although used experimentally. The standard box car of Prussia is 26 ft. long and has a capacity of 16.6 tons. Coal cars run in capacity from 22 to 40 tons, but those of the higher capacity are relatively few. The dead weight of the standard box car is 10.7 tons, or 65 per cent. of its capacity.

It is not to be assumed that Prussia is to be charged with shutting its eyes to the apparent economies in the use of the large capacity car. As a matter of fact, the peculiar conditions of the traffic there (as in England) seriously minimize the advantageous use of cars of the American type. The distinctively retail character of the freight shipments makes it difficult under present conditions for shippers to avail themselves of the special rates applying to the carload minima of 5 and 10 tons, and they are obliged to enlist the services of *spediteurs* (forwarding agents) who undertake to consolidate the freight of various shippers so as to obtain the carload rates. Small lot shipments predominate, and the immense quantities of bulk freight offered to the railroads of this country are not seen in Prussia. Much of the low-grade freight moves there by river or canal.

Another factor which influences freight car design, and which affords an example of the penalties of standardization, is the axle load limit, which is set at 31,000 lbs. Prussia is party to the rolling stock agreement between the several European nations which use the freight cars of all subscribers in common, much as the railways of the United States make common use of their freight cars. The design of cars for such joint use must necessarily conform to the clearances and track limitations of the weakest link in the chain. Italy happens to be that link, and sets the maximum axle load for the other systems which are parties to the agreement. The maximum axle load in the United States is approximately double that of the European railways. This feature, however, does not prevent the use of heavier equipment when confined exclusively to the Prussian rails. They are adding to their heavier equipment each year and are experimenting with cars of the American type. For transporting machinery and heavy guns from the Krupp works at Essen, flat cars of very high capacity are utilized. The largest has 16 axles and has a capacity of 85 tons.

The total number of freight cars of all kinds in Prussia in 1910 was 415,797, or 1,782 per 100 miles of line. The freight car density of group 2 in the same year was 2,168; and for the entire United States, 887. The number of cars, however, is not the true index. Their capacity must be considered. Ex-

*About 86 per cent. of passenger cars are fitted with air brake.

*pressed in terms of capacity per 100 miles of line, Prussia had 28,000; group 2 had 78,048; and the United States had 31,932.

TRAIN SERVICE.

In speed of passenger trains Prussia is somewhat behind England and France. The fastest train in Prussia makes the run of 178 miles between Berlin and Hamburg at an average speed of 55.2 miles per hour. The next fastest train is between Berlin and Halle, 100 miles, at a speed of 54.9 m. p. h. There are several other through trains which average over 50 m. p. h., and the average schedule speed of all through trains is given in the official statistics as 40 m. p. h. With the exception of a few of our limited trains, and the Camden-Atlantic City trains, the Prussian speeds are equal to those of this country. There are several trains, for instance, which for similar distances and a similar number of stops, make somewhat better time than the 5-hour limited trains between New York and Boston. The Prussian trains, too, are almost invariably on time.

We will now undertake a consideration of the traffic characteristics and first examine the statistics of train mileage, and passengers and tonnage handled. As already stated, the number of passengers handled in Prussia exceeds the total number handled in the United States. We are therefore prepared to find a very dense passenger train mileage per mile of road. Freight traffic is also dense in the industrial regions of western Prussia, but when averaged for all of Prussia the figures are not so impressive. A comparison of traffic and train mile density is shown in the following table:

PASSENGER MILES, TON MILES, TRAIN MILES AND OPERATING REVENUE PER MILE OF LINE, 1910.

Item—	Prussia-Hesse.	Group 2.	United States.
Passenger miles per mile of line.....	693,921	314,187	138,169
Ton miles per mile of line.....	1,150,490	2,797,011	1,071,086
Operating revenue per mile of line.....	\$22,144	\$24,619	\$11,553
Passenger train miles per mile of line.....	7,741	*5,515	*2,787
Freight train miles per mile of line.....	4,824	*4,832	*2,286
Total revenue train miles per mile of line.	12,565	10,347	5,073
Average passengers per train mile.....	87	63	56
Average revenue tons per train mile.....	236	502	380

*Special train miles included in passenger; mixed train miles in freight.

The significant facts in the above comparison are that in revenue passenger mile density the United States as a whole has only 21 per cent. of the Prussian density. Group 2, which has the greatest passenger traffic of any group in the United States, has 45 per cent. of the Prussian passenger density. In ton mile density, however, the United States is almost as much as Prussia, and group 2 exceeds Prussia in that respect by 140 per cent. The Prussian passenger trainload is considerably heavier than ours, but the majority of the passengers ride in the third and fourth-class cars, already described. In freight-trainload, however, Prussia is conspicuously low. Its average is less than half the trainload of group 2, and about two-thirds that of the whole United States.

PASSENGER TRAFFIC AND RATES.

The German statistics of traffic are available in great detail, and we are able to analyze the receipts and averages for each class of passenger and freight. To show the results for the passenger service, the following summary is inserted:

DIVISION OF PASSENGER TRAFFIC, PRUSSIA-HESSE, 1910.

Class—	Per Ct. of passengers carried	Per Ct. of passenger miles	Per Ct. of passenger revenue	Average revenue per passenger	Average revenue per passenger mile	Average revenue per passenger
First class .....	.14	.89	2.94	\$2.65	2.89c	92
Second class	9.66	11.00	18.56	.25	1.49	16
Third class	43.66	39.51	41.65	.12	.93	13
Fourth class	45.51	44.59	35.09	.10	.69	14
Military	1.03	4.01	1.76	.22	.39	56
Total	100.0	100.0	100.0	.13	.88	14
Tickets sold at reduced rates						
—season tickets, workmen's, school tickets, etc. (included in above)	55.46	26.75	14.53	.03	.38	7

The preponderance of the third and fourth-class traffic, and the exceedingly small number of first-class passengers, are noticeable. The astonishingly low average passenger mile rate (8.8 mills) loses much of its value for purposes of comparison

with this country because it includes such a relatively large number of passengers who travel in the inferior class compartments. The returns include also the traffic on passenger belt lines in Berlin and the electric railway between Hamburg and Altona. Both of these lines carry a heavy traffic, which is essentially the same as is handled by the subways and elevated railways of New York, Chicago or Boston.

In second-class compartments, which come nearest to our day coaches, the Prussian average revenue was 1.49 cents per mile. Our average in the same year for all passenger traffic was 1.938 cent. The Prussian first-class corresponds to our parlor cars. Their average receipts for that class were 2.89 cents per mile, which is substantially above our average, even when the Pullman car fare is added. For instance, the regular fare from New York to Boston is \$4.75. Add \$1.00 for parlor car seat and we have an average rate of 2.47 cents per mile.

In passing, attention should be called to the fact that there is no free baggage allowance in Germany. Passengers may take a generous amount of hand baggage with them in the compartments, but trunks and other similar baggage must be registered and transported in the baggage car. The baggage tariff is on the zone principle. For example, the charge for the first zone (1 to 15.5 miles) runs from 5 cents for 44 lbs., to 14 cents for 165 lbs. For the fourth zone (95 to 124 miles) the charges are 12 cents and 71 cents respectively. For the sixth zone (158 to 186 miles) the charges are 12 cents and \$1.07. To illustrate further, by again using the New York and Boston journey, the additional cost of a trunk weighing 150 lbs. would, under the Prussian tariff, be \$1.43, which is equivalent to adding 0.61 cent. per mile to the price of the ticket.

The Prussian statistics show, however, that relatively few passengers carry other than hand baggage. Altogether in 1910, the railways transported 820,000 tons of baggage. This is an average of 1½ lbs. per passenger. The revenue from baggage was \$4,370,000, or 27 cents per 100 lbs. The average distance carried was 65 miles. Each 100 lbs. of baggage, therefore, cost the traveler 41 cents for each 100 miles transported. Baggage charges made up 3 per cent. of the total passenger revenue.

Before leaving the passenger service, mention should be made of the practice of selling "bahnsteig" (platform) tickets which permit the friends of incoming and outgoing passengers to meet or part with them on the station platform at the car door. These tickets, which cost 10 pfennig (2.4 cents) are procured through slot machines. They are punched by the gateman when the holders pass through the gate to the platform, and are collected when they leave the platform. In 1910, 31,000,000 of such tickets were sold (85,000 per day) and they yielded a revenue of \$735,000. This, of course, is clear profit.

FREIGHT RATES.

It is much more difficult, if not hopeless, to make any intelligent comparison of freight rates, because of the fundamentally different conditions. In the first place, we must recognize in the case of freight rates, as well as in passenger rates, wages, and cost of operation, that the purchasing power of money is greater in Prussia. How much greater, it is impossible to state with accuracy. In discussing comparative wages, the writer gave as his estimate that the cost of living in Berlin is from 60 per cent. to 66 per cent. of the cost in Boston.

In the second place, the policy of the government is to develop the traffic on the rivers and canals, and to prevent the railways from competing with the waterways. Thus, the lower grade commodities and other freight which will stand the slower movement go by water, under a subsidy, since most canals and improved waterways do not yield enough in tolls to pay for interest and maintenance. The proportion of water-borne tonnage at low rates is, therefore, much higher in Prussia than in the United States, and the Prussian ton mile rate is based on a much higher proportion of high grade commodities moving under the higher rates.

In the third place, there are no express companies in Ger-

many, and with the exception of the smaller packages, which may go by parcel post, this class of goods moves under the high class rates in freight cars.

In the fourth place, the average distance per shipment is just about half that of this country, consequently the element of terminal expense for each ton-mile is greater. The terminal expense, which is a large part of the total expense of moving traffic, is not affected by the length of the haul. It is just the same for a haul of 68 miles (the average Prussian haul) as for 138 miles (the average for the United States). The importance of this factor may be appreciated when it is realized that each ton of freight is handled through a terminal twice in Prussia to once in this country, since the average haul in this country is twice that of Prussia.

In the fifth place, the Prussian freight shipments are distinctly retail in character.

On the other side of the comparison, it should be noted that the conditions surrounding the process of shipping are more burdensome to the shipper. It is difficult to collect claims. Their movement is slower than ours. There are many complications in regard to classifications and tariffs, and the demurrage regulations are severe. In time of car shortage*** the free limit is reduced from the normal period of one day, to 12 hours, 8 hours, and even to 6 hours. The normal charge per day is 48 cents for the first day over the free period, 72 cents for the second day, and 95 cents for every additional day. The low capacity of the cars is to be borne in mind when comparing these demurrage conditions with ours. Besides this, there is a slight charge for the necessary printed forms. For instance, bills of lading cost \$2 per 1,000. Again, when open cars are used, and covering is necessary, a charge is made for the use of the tarpaulin sheets which protect the freight. For distances of 63 to 125 miles, the minimum charge for two sheets is 72 cents.

No two persons, equally qualified to express opinions on the subject, will agree upon the weight to be given to the various factors, and any attempt here to devise a unit of comparison would only lead to profitless discussion. The writer will, therefore, leave the subject for each to form his own conclusion from an interpretation of the following statistics showing the freight traffic in Prussia in 1910; but will venture as his opinion in passing that freight rates are on the whole somewhat too high. The large surplus which is turned over to the state each year certainly is not made from the transportation of passengers. Freight shippers by rail are being indirectly taxed for the benefit of the state at large; while shippers by water have the benefit of state subsidies which come from the public at large—a conflicting situation.

It is commonly believed by those who advocate government ownership of railways that the Prussian freight tariff is the essence of simplicity, and if adopted here, would afford the solution to all of our freight rate problems. They are told that the Prussian rate is divided into two elements: (1) the terminal charge, and (2) the movement charge; the former graded for zones of 10 km. up to 100 km. (62.1 miles) and the latter graded for zones of 50 and 100 km. up to 500 km. (310 miles). This is correct so far as it goes, but there are so many exceptions to the zone tariffs that most of the seeming simplicity disappears. It is a common complaint among German shippers that the tariffs and shipping regulations are so complicated that they require experts to unravel them, and in the main they depend upon forwarding agents (*speditours*) to attend to all details of shipping for them. The exceptional tariffs which correspond to our commodity tariffs cover 61 per cent. of the ton mileage, and have the lowest ton mile rate of 0.9 cent. Express freight takes the highest ton mile rate of 5.41 cents, and the average for all classes of freight is 1.248 cent per ton mile. The average for this country is 0.76 cent per ton mile, or 61 per cent. of the Prussian average. We have a few rail-

roads, however, with a ton-mile rate which equals or exceeds that of Prussia. Usually, where that conditions obtains, it will be found that the freight traffic is largely local, or contains a relatively large amount of merchandise or other high-grade freight to which high-class rates apply, and also that the proportion of coal, iron, grain and other bulk freight moving under low commodity rates is relatively small. Such is the case on the New York, New Haven & Hartford.

CONCLUSION.

The writer's conclusion is that it is futile to attempt any exact comparison either of freight rates, passenger rates, expenses, or net returns in terms of percentages or of ratios of one country to those of the other country. When social and economic conditions are so essentially dissimilar, it is impossible to find a measuring stick which will permit us to gage the relative reasonableness of rates or the relative efficiency of operation. The real question is, "How well does the transportation system of each country measure up to the requirements of that country?" The answer must necessarily be based on opinion rather than on fact. In both countries we find those who praise and those who criticize the railways. But considering the Prussian situation alone, it seemed to the writer, from personal observation and study on the ground, that state ownership of railways in Prussia is successful and that the railways are operated with reasonable efficiency.

If it is granted that Prussia has met with substantial success in owning and operating its railways, it does not at all follow that government ownership in this country would be equally successful. That subject justifies a complete paper in itself, and we can do no more than touch upon it here in closing. Suffice it to say that nowhere are conditions more ideal for government ownership than in Prussia. It has a strongly centralized government. The administrative head of the railways—the Minister of Public Works—is appointed by and responsible to the king personally. Changes in that office, or in fact in any of the high offices, are infrequent. Civil service principles apply in the promotion of officials as well as of workmen. Military discipline obtains throughout the entire army of employees. It permeates the whole social organization of the country. The administration appears to be entirely free from graft. Little is heard of political patronage. In fact, government service there is regarded as highly honorable service.

Can we say as much for this country? Is our public service elevated to such a plane that we can safely trust it with the great enlargement of power which would come with government ownership of railways? Are we sufficiently insured against "pork barrel" methods of making and disbursing the budget? Are we sure that the quality and efficiency of service would not be lowered rather than improved?

He who would answer these questions in the affirmative is indeed an optimist!

BRAZIL RAILWAY IMPROVEMENTS.—A report on a journey to Southern Brazil in October, 1912, by Sir W. Haggard, says that the main improvement to which the Brazil Railway Company is directing serious consideration, is the straightening of numerous winding curves—which is particularly needed between Itararé and Ponta Grossa—and the process has already been completed on the Paraná line. "Of three such lines constructed prior to their being taken over by the Brazil Railway Company, the Sorocabana and Paraná are undoubtedly," says the report, "the more prosperous, and the section of the Sao Paulo-Rio Grande over which we traveled must for the present come in a bad third. The paucity of population all along this line was obvious. We traversed great distances without seeing more than small isolated huts. Whenever we were in the proximity of a town the settlements visibly increased, and some serious attempt had been made at cultivating the soil, but the main problem which the company have to solve, and which they have already attacked, is the remedying of this want of labor."

***The car shortage becomes acute every fall and seriously affects the mining and manufacturing districts of Westphalia. In last December the shortage was 12,000 cars in the Essen-Ruhr district.

NEW D. L. & W. LINE NORTH OF SCRANTON, PA.

Radical Improvement Being Made in Grade and Alinement
from Clark's Summit to Hallstead. Several Unusual Structures.

The Lackawanna now has under construction a new line between Clark's Summit, Pa., and Hallstead, 41 miles, which involves some very heavy work and several structures of unusual size.

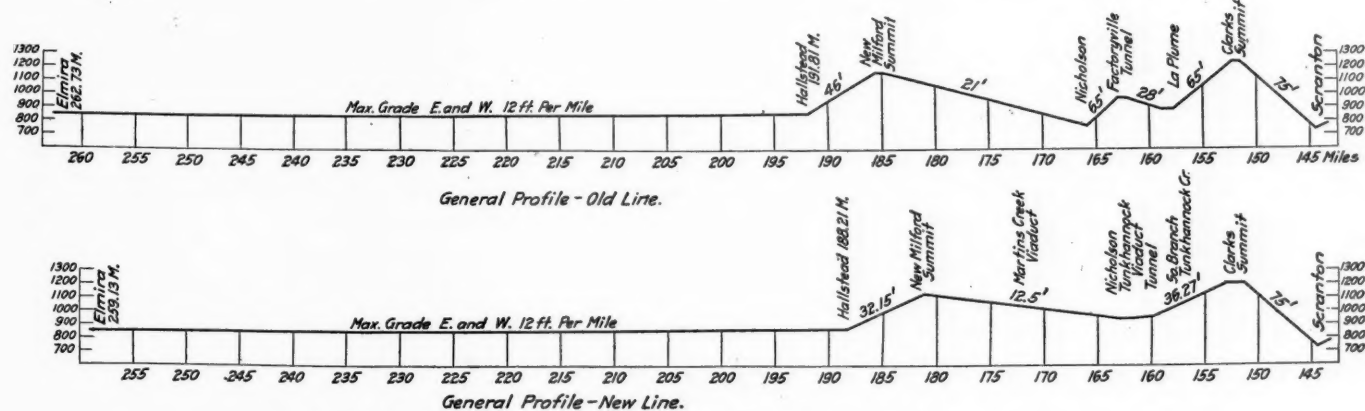
The accompanying profile shows the present and proposed grades on the main line between Scranton, Pa., and Elmira, N. Y. This part of the road is a portion of the main line between New York and Buffalo, and freight trains operate between the above two points as terminals. Prior to 1910, all coal and dead freight was switched at Hallstead, Pa., 48 miles north of Scranton. Turn-around runs operated between the Kingston, Taylor and Scranton coal districts and Hallstead, thus providing tonnage at the latter point for filling out west bound trains, and the extra power necessary to handle trains over the heavy grades east from Hallstead. Crews also operated between Hallstead and Syracuse, and Hallstead and Utica. This operation required a yard and terminal facilities at Hallstead, including engine house, coaling station, ash pits, etc., and necessitated a considerable delay to all through trains.

During 1910, a hump yard was completed and put in operation on the Keyser Valley branch, at Scranton, to make up coal and dead freight trains for movement both east and west out of

compensated for curvature. From Hallstead west to Elmira the controlling grade is approximately 12 ft. per mile, in either direction.

A glance at the profile will readily show that a great amount of pusher service is necessary, both east and west, between Hallstead and Scranton in order to handle the tonnage in one train which can be handled by one engine between Hallstead and Elmira.

It was desirable to relocate, if possible, so as to eliminate all west bound pusher grades west of Clark's Summit and to reduce the east bound grades so that any class of engine in this service can handle its regular tonnage for the line west of Hallstead, east bound east of Hallstead, by means of a pusher of the same class. By a comparison of the tonnage handled on other parts of the road with similar operating and physical conditions, it was found that the east bound grades should be reduced to 36 ft. per mile, if possible. Two deg. was fixed as the maximum allowable curvature. With the above basis as a guide, the new line, now under construction, was finally decided upon after a series of surveys extending over a period of three years. About 300 miles of preliminary line were run, and four different lines were located. The country through which the line passes is quite rough



Profile of the D. L. & W. Old and New Line Between Elmira and Scranton.

Scranton. A large engine house, coaling station, ash handling plant, equipment for minor repairs, etc., were built in connection with the hump yard. The coal from the various mining districts is handled by special crews to the receiving yard above the hump. Trains are now run through between this yard and Elmira, Syracuse and Utica, with no long delays other than that required to clean ashes and take coal at a new plant built for this purpose at Binghamton, and eliminating the delay to road crews at Hallstead.

After ascending from Scranton to Clark's Summit, a distance of seven miles, on grade of 75 ft. to the mile, the present line descends to the south branch of the Tunkhannock creek at LaPlume on a grade of 65 ft. to the mile, then ascends on a 28 ft. grade to the Factoryville tunnel. This tunnel is 2,200 ft. long and passes through the ridge between the south and main branches of Tunkhannock creek. West of the tunnel, the line again descends on a 65 ft. grade to the Tunkhannock creek, at Nicholson, then ascends along the east bank of Martins creek to New Milford Summit on a 21 ft. grade. From New Milford Summit to Hallstead, the line descends along Salt creek to the Susquehanna river on a grade varying from 30 to 47 ft. to the mile.

Practically 50 per cent. of the line between Clark's Summit and Hallstead is curved, and many of the curves are between four and six deg. The total curvature in this distance of 43 miles is 3,940 deg. None of the grades above mentioned are

and the general direction of the streams is at right angles to that of the line. Their beds are from 300 to 700 ft. below the surrounding hills. As no government contour maps have been made of this territory, the work of locating was extremely tedious.

On the new line, the main branch of Tunkhannock creek is crossed about 240 ft. above the bed of the stream; the south branch of Tunkhannock creek and also Martins creek are crossed at a height of about 150 ft. The south branch crossing will be made by a fill, containing about 1,600,000 cu. yds. At the Martins creek crossing the new line passes over the present line 88 ft. above on a three-track concrete viaduct, 1,600 ft. long, composed of two 50-ft., two 100-ft. semi-circular arches, and seven 150-ft. three centered arches with a rise of 59 ft.

The Tunkhannock creek viaduct is to be a double track structure, 2,375 ft. long over-all, and, as above stated, will have a maximum height of 240 ft. above the bed of the creek. There will be two 100-ft. semi-circular abutment arch spans and ten 180-ft. semi-circular arch spans. All piers are to be carried to bed rock, which varies in depth up to 95 ft. below the surface of the ground.

It was only decided to use concrete structures for these two viaducts after a very careful and extended study of the problem. Bids were secured on several styles of steel structures and, while those acceptable in design were somewhat less expensive

when first cost only was considered, they were less desirable when maintenance and other important items were taken into consideration.

The tracks will be carried through the divide between the south and main branches of Tunkhannock creek by a tunnel, 3,600 ft. long. This tunnel will have 50 ft. air shafts for ventilation.

The accompanying table gives a brief comparison of the physical characteristics of the old and new line.

	OLD LINE-NEW LINE SAVINGS.		
	Old	New	Saving
Length of line	43.2 miles	39.6 miles	3.6 miles
Maximum grade eastbound (uncompensated)	1.23%	.68%	.55%
Maximum grade westbound (uncompensated) .....	.52%	.237%	.283%
Rise and fall	553	226	327
Maximum degree curvature	6° 22'	*3° 00'	3° 22'
Total degree curvature	3,940	1,500	2,440
Degrees per mile	96	36	50

*Very few curves exceed 2 deg. on the new line.

Space will not permit an elaboration on the method used in calculating the amount of money which could be spent in reconstructing this line so that the decreased cost of operation and maintenance, due to reduction of distance, elimination of curvature, rise and fall and reduction of gradient would meet the interest charge. However, among the items taken into consideration in this computation were the total cost of operation and maintenance for the year 1910; the total train miles, exclu-

on the Tunkhannock viaduct. From New Milford to Hallstead, two new tracks are to be built for east bound movement. The present two tracks, with some slight revision in alinement, will remain for westbound movement. The entire line will be constructed without any highway crossing at grade.

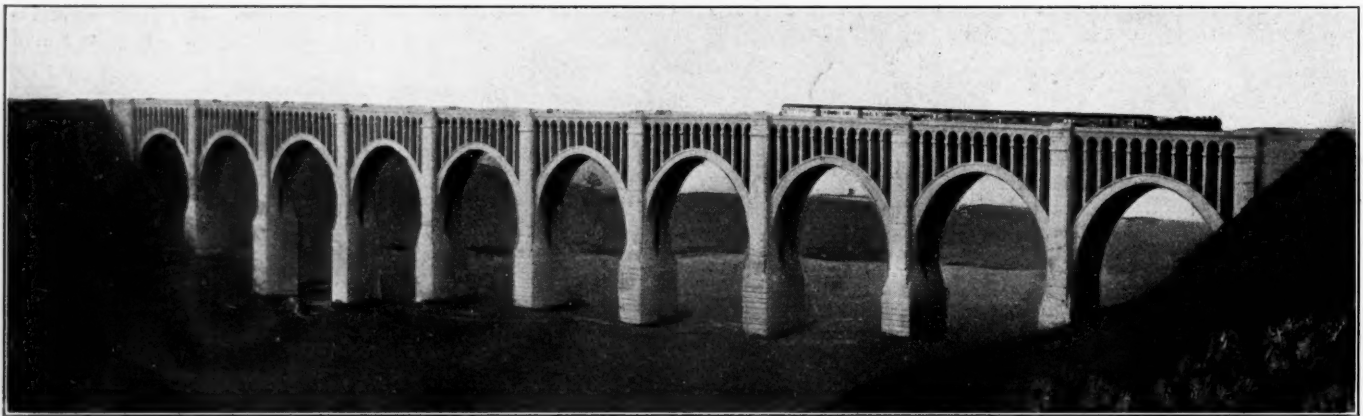
THE DEMANDS OF THE TRAINMEN.

The joint committee of one hundred, representing the trainmen and conductors on the eastern railroads, began conferences on April 22 with the committee of the managers. Elisha Lee, chairman of the managers' committee, presided, and the spokesmen for the trainmen and conductors were William G. Lee, president of the Brotherhood of Railroad Trainmen, and A. B. Garretson, president of the Order of Railroad Conductors.

The demands of the trainmen are as follows:

Article A. On runs of 155 miles per day or over the pay of passenger conductors on steam or electric trains to be 2.90 cents per mile; baggagemen 1.87 per mile; flagmen or rear brakemen 1.80 per mile; brakemen 1.74 per mile.

Article B. On runs of less than 155 miles per day the pay of passenger conductors to be \$4.50 per day; baggagemen \$2.90 per day; flagmen or rear brakemen \$2.80 per day; brakemen \$2.70 per day.



Model of Tunkhannock Creek Viaduct.

sive of work train mileage, for 1910; the cost of operation and maintenance per train mile; the average yearly increased cost of operation and maintenance per train mile from 1900 to 1910 = 4.4 per cent.; the average yearly increase in net tons of freight handled 1900 to 1910 = 7.425 per cent.; the average yearly increase in passengers carried 1900 to 1910 = 8.2 per cent.; the total net tons of manifest freight moved over the territory in question for 1910 (east, 1,324,907; west, 592,713); the total net tons of all classes of freight moved over the territory in question for 1910 (east, 3,134,688; west, 6,967,269); the total number of freight cars moved over the territory in question in 1910 (east, 188,237 loads, 122,919 empties; west, 143,279 loads, 123,146 empties); total tons east, 8,306,003; total tons west, 12,066,973; passenger and milk trains, east and west bound (= 26); total reduction of distance; elimination of curvature (total degrees); elimination of rise and fall, and reduction of gradient.

In further considering the advisability of relocating the line, consideration was given to the fact that an additional third track would soon have to be constructed along the present alinement, especially on the heavy grades. Furthermore, there are on the present line 22 public highway crossings at grade, all of which would have to be eliminated in the near future, some of them at a very considerable expense.

The contracts for the entire work were let about a year ago. The roadbed is being constructed for three tracks between Clark's Summit and New Milford, excepting at the tunnel and

Article C. Passenger trainmen on short turn around runs, no single trip of which exceeds 80 miles, including suburban and branch line service, shall be paid overtime for all time actually on duty or held for duty in excess of eight hours (computed on each run from the time required to report for duty to end of the run) within ten consecutive hours, and also for all time in excess of ten consecutive hours, computed continuously from time first required to report until final release at end of last run; and such will be computed for each employee on the basis of overtime worked or held for duty at the following rates:

Conductors	45 cents per hour
Baggagemen	29 cents per hour
Flagmen or rear brakemen	28 cents per hour
Brakemen	27 cents per hour

(a) All other passenger trainmen shall be paid for overtime on the speed basis of twenty-five miles per hour, computed from the time required to report for duty until released at end of last run. Overtime will be computed on the basis of actual overtime worked, or held for duty, at the pro rata rate.

(b) Regularly assigned passenger trainmen who are ready for service the entire month and who do not lay off on their own accord shall receive the following minimum sums, exclusive of overtime or extra service, for the calendar months:

Conductors	\$135.00
Baggagemen	87.00
Flagmen or rear brakemen	84.00
Brakemen	81.00

(c) When regular passenger men lay off of their own accord or are held out of service extra men will receive the same com-

pensation regular men would have received and the amount to be paid the extra man shall be taken from the amount the regular man would have received had he remained in service; the sum of the payment to men who may be used on the run equalling the monthly guarantee.

Article D. Reductions in crews or increases in mileage in passenger service from assignments in effect November 1, 1912, will not be made for the purpose of offsetting (or having the effect of offsetting) these increases in wages.

Article E. The increases herein requested to apply to all rates for special or incidental service or for classes of service not named herein as specified in the individual schedules.

Article F. Through and irregular freight service to be paid as follows: Conductors, 4.18 cents a mile; flagmen, 2.88 cents a mile; brakemen, 2.78 cents a mile; runs of 100 miles or less either straightaway or turn around to be paid for as 100 miles.

Article G. Way freight, pickup or drop, mine and roustabout service shall be paid as follows: Conductors, 4.84 cents a mile; flagmen, 3.31 cents a mile; brakemen, 3.21 cents a mile; runs of 100 miles or less either straightaway or turn around to be paid as 100 miles.

Article H. Work, construction, snowplough, circus or wreck train crews shall be paid as follows: Conductors, \$4.50 a day; flagmen, \$3.10 a day; brakemen, \$3 a day; 100 miles or less, ten hours or less, shall constitute a day's work, overtime to be paid as time and one-half.

Article I. In all freight, mixed and mine service, including pusher or helper service, 100 miles or less, ten hours or less shall constitute a day's work; on all runs of 100 miles or less overtime shall be paid for all time in excess of ten hours, and on runs of over 100 miles overtime shall be paid for the time used in excess of the time necessary to complete the trip at an average speed of ten miles an hour. The working time of trainmen shall begin at the time they are required to report for duty and do report; and shall continue until they are relieved from duty at end of run. Overtime shall be computed for each employee on the basis of actual overtime worked or held for duty and be paid for at the rate of fifteen miles an hour for the class of service performed.

Article J. The same percentage of increases as herein given in through freight service to be given also in milk, helper and all other classes of service, whether special or incidental, as specified in the individual schedules.

Article K. Regularly assigned way freight, wreck, work and construction crews who are ready for service the entire month and do not lay off of their own accord will be guaranteed not less than 100 miles or ten hours for each calendar working day, exclusive of overtime. (This to include legal holidays.)

Article L. Deadheading in freight or passenger service to be paid for at full rate for the class of service in which regularly engaged. Trainmen running with light engine or engine and caboose will be paid through freight rates.

Article M. Unassigned freight crews held at other than their home terminals longer than twelve hours will be paid at the rate of ten miles per hour at the through freight rates for time so held, time to be computed from the time crews go off duty until one hour before the departure of the train on which they resume duty.

Article N. Time and one-half will be paid to crews handling double headed trains of two engines; if more than two engines are used, or if either or both of the engines used in double headed trains are of the Mallet type, double time will be paid.

Article O. The Chicago standard rates of pay to govern all yards; ten hours or less to constitute a day's work. Overtime to be paid as time and one-half, and be computed for each employee on the basis of actual overtime worked or held for duty, actual minutes to be counted. (The above rule does not apply to roads having a shorter workday.)

Article P. Upon roads having a better basis for a day's work or for payment of overtime or other rates or allowances in pas-

senger, freight, yard, mixed, work train service or other service the adoption of the foregoing rates and rules shall not operate as a reduction thereof.

CENTRAL & WESTERN ASSOCIATION OF CAR SERVICE OFFICERS.

The Central & Western Association of Car Service Officers held its annual meeting at the Grand Pacific hotel, Chicago, on April 17, with President E. E. Betts, superintendent of transportation of the Chicago & North Western, in the chair. A recommendation of the committee on office methods and accounting, providing that when a car is reported in an unserviceable condition and beyond repair the road in whose possession it is shall be required, with the consent of the owner, to destroy it and credit the owner with the salvage, was adopted and referred to the Association of Transportation & Car Accounting Officers, as were several other recommendations providing for minor changes in rules.

There was a long informal discussion of the proposed abolition of the per diem reclaim rule by the American Railway Association of July 1, which has been postponed for six months. Representatives of switching roads present were strongly opposed to the abolition of reclaim for the reason that no substitute is offered, and that the amounts paid for per diem would be a direct loss. Several important switching roads, including the Terminal Railroad Association of St. Louis and the Belt Railway of Chicago, had decided to withdraw from the per diem rules agreement before it was decided to postpone the change. Considerable discussion ensued as to whether the present rules should be retained, providing for a reclaim of per diem for an arbitrary number of days to be determined for each local territory, or whether it should be based on the number of days actually required by each road. It was asserted that the principal purpose in the abolition of the rule was to prevent the payment of virtual rebates to short industrial roads by allowing them a reclaim for a larger number of days than they usually pay per diem for, and that this abuse could be eliminated if the reclaim were based on the actual average requirements of individual roads, instead of an average for each territory. It was decided to appoint a committee of three to consider the subject and report at the next meeting in Chicago on November 13. Officers were elected as follows:

President, D. C. Fredericks, car service agent, Chicago, Peoria & St. Louis.

Vice-president, E. T. Kennan, auditor and car accountant, Indianapolis Union.

Secretary, W. E. Beecham, car accountant, Chicago, Milwaukee & St. Paul.

Treasurer, F. M. Luce, superintendent of car service, Chicago & North Western.

Mr. Beecham and Mr. Luce were re-elected. J. R. Pickering, superintendent of car service of the Chicago, Rock Island & Pacific, was elected a member of the executive committee for three years.

PASSENGER TRAFFIC ON THE BUENOS AYRES GREAT SOUTHERN, ARGENTINA.—The number of passengers carried during the last half of 1912 by the Buenos Ayres Great Southern were 13,313,689, compared with 12,000,440 for the corresponding period of 1911, an increase of 1,313,249, or 10.94 per cent.

NEW MILEAGE IN ARGENTINA.—During the last half of the calendar year of 1912, 89 miles of extensions were opened to traffic by the Buenos Ayres Great Southern. These extensions comprise one from Juancho to Vivorata, 49 miles; Barrow to Juan E. Barra, 37 miles, and an extension of the quarry line at Tandil, 3 miles. The total length of the system on December 31, 1912, was 3,574 miles.

NEW DELAWARE RIVER BRIDGE OF THE P. & R.

Double Track Concrete Arch Structure Now Being Completed
at Yardley, Pa.—Construction Plant Installed by Contractor.

By EDWIN CHAMBERLAIN,
Assistant Engineer, Philadelphia & Reading.

The Philadelphia & Reading has almost completed the construction of a double track concrete arch bridge on the New York division across the Delaware river near Yardley, Pa. The new bridge is parallel to and 35 ft. down stream from the old structure which it will replace and which will be dismantled after the new bridge is put into service. The old double track bridge which is made up of seven pin connected and two deck plate girder spans, carrying two tracks, was built jointly by the North Pennsylvania Railroad and the Delaware & Bound Brook Railroad. It was erected in 1875 and opened for traffic in May,

2 to 11 inclusive being protected by bent plates 18 in. by $\frac{1}{2}$ in. anchored to the pier by 12-in. by $\frac{3}{4}$ -in. round swedged bolts. The side and end faces of the piers have a batter of $\frac{1}{2}$ in. to the foot. This section is capped by a coping course 11 ft. wide and 2 ft. thick, the top of the coping being about 4 ft. below the springing line of the arch.

The spandrel walls are designed as gravity sections and are also reinforced with twisted vertical rods $\frac{3}{4}$ in. square and spaced 4 ft. center to center. The pilasters are carried about five ft. above the base of rail and extend beyond the face lines

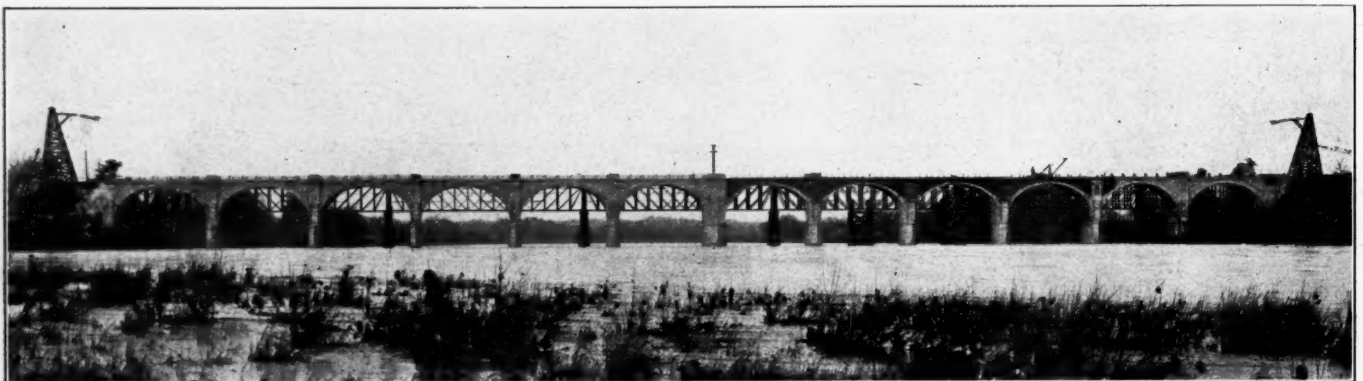


Fig. 1—Yardley Bridge Looking from the Downstream Side.

1876, since which date it has been in continuous service. It was, however, strengthened in 1883 by an addition of 50 per cent. to the trusses and 100 per cent. to the floor system by the introduction of a middle truss.

The new bridge consists of 14 arches, 11 of which have a span of 90 ft. 9 in. and three 85 ft. 11 in. The total length between ends of abutments is 1,445.5 ft. The bridge is built on a rising grade to the eastward of 0.22 per cent., and is 33 ft. wide from out to out of coping, with tracks 13 ft. center to center. The base of rail is about 70 ft. above low water in the

of the arches, providing refuge bays at the track level. With the intermediate concrete posts and two lines of 4-in. galvanized iron pipes they form a very substantial and effective railing. Embedded in each of the spandrel walls is a four-way vitrified clay conduit with manholes placed at frequent intervals to carry the telephone and telegraph wires, instead of attaching them to the outside of the bridge.

The drainage is taken care of by means of an 8-in. cast-iron pipe, extending from the valleys over the piers to the soffit of the arch. The spandrel filling is composed entirely of one

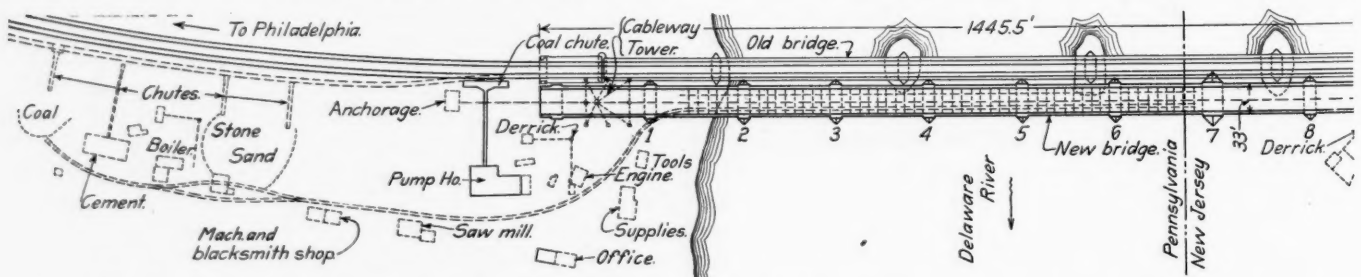


Fig. 2—Plan of Bridge Over the Delaware River on the Philadelphia & Reading, Showing Contractor's Plant.

river and about 80 ft. above bed rock. The intrados of the arch ring is five centered, having a rise of 35 ft., a crown thickness of 3 ft. 6 in. and a radial width at the junction of each arch, over the piers, of about 13 ft. 6 in. Two lines of reinforcing rods are embedded in the arch rings; one line at the intrados and the other at the extrados, each being $\frac{3}{4}$ in. square twisted and spaced 7 in. center to center. These were tied in with transverse rods $\frac{1}{2}$ in. square and spaced 3 ft. apart.

The piers are of the type shown, the center or abutment pier having a width of 20 ft. and the intermediate piers a width of 10 ft. at the springing line. The ends are symmetrical in shape, having cut-water extensions, the up-stream noses of piers

and two man size stone carried to the sub-grade of the roadbed. The water-proofing of the arches is composed of five layers of felt protected by a layer of hard bricks thoroughly mopped, applied to the tops of the arches between the spandrel walls, flashed up about 12 in. along the inner faces of the spandrels except directly over the piers where the flashing extends four ft. above the tops of the arches. All vertical expansion and horizontal construction joints are protected by a single layer of prepared burlap 12 in. wide thoroughly mopped with asphalt compound. This burlap is carried under the coping at all expansion joints.

The contract for the work was let to the Talbot Construction

Co., of New York, in April, 1911. Included with the river bridge contract was the extension of the masonry at the bridge crossing the tracks of the Pennsylvania and the feeder of the Delaware and Raritan canal, made necessary by the change in alignment across the river. On May 15 the contractors began to assemble their plant in preparation for starting the work, but it was nearly two months before they were prepared to make a start on the foundations in the river and on July 21 the first concrete was deposited on bed rock for the foundation of pier No. 2.

PLANT.

The contractors decided to conduct the work from both sides of the river and for this purpose duplicate plants were installed near each end of the bridge as shown upon the accompanying plan. The materials used in the Pennsylvania half of the bridge were shipped over the Reading to a siding at the elevation of the main tracks and dumped from the cars into chutes, by which the sand and pebbles were conveyed to storage piles, and the cement to storehouses at the base of the main track embankment. The height of this embankment, about 45 ft., afforded almost unlimited capacity for the storage of materials at practically no additional cost for rehandling. The cement house, with a capacity of 14 cars, had a narrow gage track laid on the floor, upon which a car containing a skip holding 50 bags was operated to serve the mixer which was about 100 ft. distant. This skip was hoisted from the car to the charging platform by the supply derrick which delivered the pebbles and sand to the mixer bins.

The mixing plant on the New Jersey side of the river was located along the Pennsylvania, over which all the materials for this half of the bridge were shipped and delivered to a siding leading to the mixing plant and storage piles. A derrick operating a clam-shell bucket unloaded the cars and delivered the concrete materials either to the mixer bins or to storage piles. The mixing plants were similar in construction and of the enclosed cube type sufficiently elevated on a timber framework to dump the mixture into cars or into buckets on flat cars. The mixers were belt connected to horizontal steam engines. Above the mixers were the measuring and supply bins, the latter having

two hours, the average for the day would fall to about 15 or 16 batches per hour. The distance from the mixers to the work hindered more rapid progress.

The construction work on the Pennsylvania side of the river was carried on from a temporary pile trestle, built on the center line of the new bridge and reaching to the middle of the river at pier 7, the piers being numbered from the Pennsylvania side. This trestle was composed of five-pile bents spaced about 10 ft. between centers and capped with 12-in. by 12-in. timbers, with 3-in. by 12-in. cross bracing. The stringers generally were of 12-in. by 16-in. timbers upon which were placed 3-in. by 12-in. planks to which the rails were spiked. This trestle supported a 20-ft. gage track for the operation of a steel traveling crane, which was used in placing the coffer dams, in excavating the pier foundations and in placing the concrete from the flat cars into the foundations or forms. It also supported a narrow gage track used in transporting concrete, etc., by small locomotives from the mixing plant, located about 500 ft. back from the shore.

On the New Jersey side construction was handled by a series of stiff leg derricks, placed south of the bridge and midway of the piers, so that each derrick served two piers. These derricks were used in handling the excavation and in placing the materials in the piers. A temporary trestle, about 1,200 ft. long, carrying a narrow gage track, extended from the mixing plant into the river to a point between piers 8 and 9. The piers were completed to the springing line of the arches from the river trestle and stiff leg derricks.

On the Pennsylvania side the work of completing the piers began with pier 7, and as each succeeding pier was completed it was necessary to abandon the river trestle between the completed piers. While this part of the work was progressing a cableway was being installed on the center line of the bridge with towers 125 ft. high. The Pennsylvania tower was located between the west abutment and pier 1 and the New Jersey tower between pier 13 and the east abutment, making a clear span of 1,320 ft. The towers were built of long leaf yellow pine lumber and were supported on concrete foundations. They were composed of eight 12-in. by 12-in. posts to a height of 78 ft., and four posts for the remainder of the distance to the top. The bracing was of 3-in. by 12-in. material throughout. A saddle

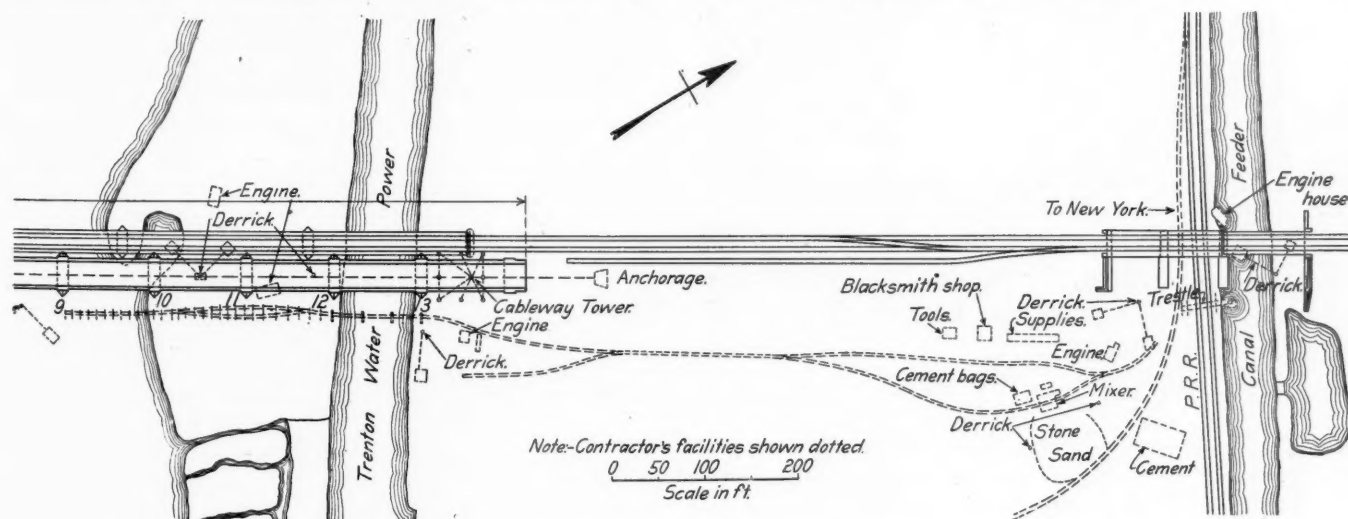


Fig. 2—Plan of Bridge Over the Delaware River on the Philadelphia & Reading, Showing Contractor's Plant.

two compartments, one for stone with a capacity of 22 cu. yds. and the other for sand with a capacity of 14 cu. yds. The water for mixing was supplied through the main shaft of the cube, which is hollow and connected to the supply tanks, the amount being regulated by the number of turns made.

The capacity of the mixers was about 25 batches of 1.6 cu. yds. each per hour, but this speed was not attained at any time during the work. The transportation facilities were the limiting features and while they handled 20 or 22 batches per hour for one or

of three 12-in. by 14-in. by 6-ft. oak timbers at the top supported the cable. A total of about 28,000 ft. b. m. of lumber was used in each of these towers. The main cable was $1\frac{3}{4}$ in. in diameter and was made up of six strands of 19 wires each, of plow steel with an ultimate stress of 112 tons. The cable was supported on an A-frame at the center pier, dividing it into two spans, each of which was operated by a 50 h. p. double cylinder, double friction drum hoisting engine made by the S. Flory Manufacturing Company, Bangor, Pa. The cableway was used for the re-

mainder of the concrete work above the springing line of arches and in placing the forms and centers.

In building the spandrel walls the steel traveling crane was used in connection with the cableway, operating from a track built on the completed arch rings; drop bottom buckets of $1\frac{3}{4}$ cu. yd. capacity were used throughout the work. A portable steam saw mill manufactured by the American Saw Mill Company, of Hackettstown, N. J., carrying a 44-in. circular saw, was installed by the contractors, and proved of great economy in resawing the heavy lumber required in the early part of the work into smaller sizes for use in the pilaster and spandrel wall forms.

FOUNDATIONS.

The foundations for the abutments and piers were all carried to bed rock, although the abutments were originally designed to be built on concrete piles driven to rock. This construction was

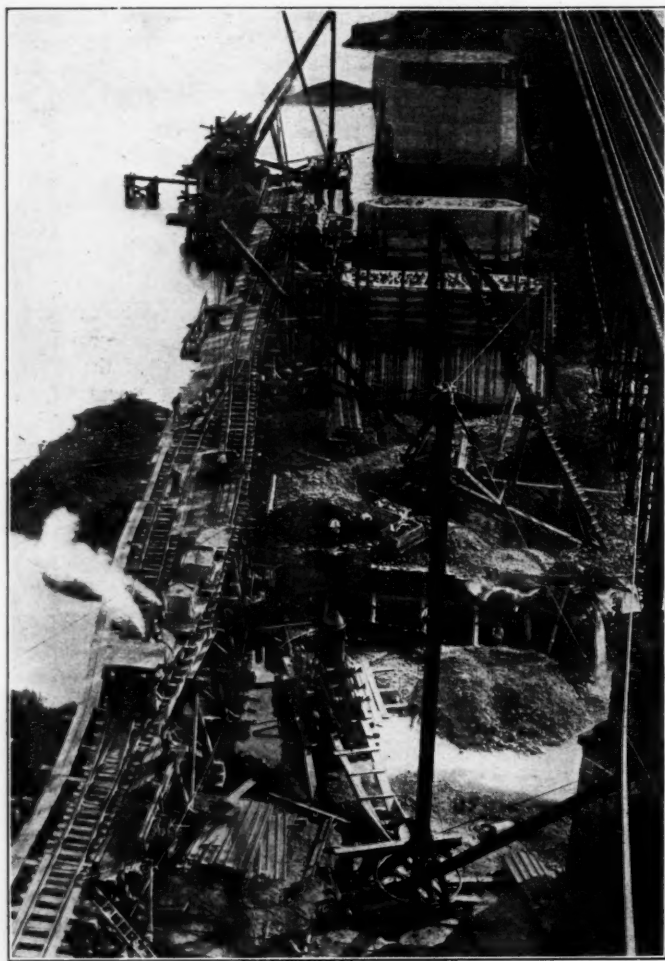


Fig. 3—General View of Work on the New Jersey Side.

adopted on account of the proximity of the new abutments to those of the old structure and the fact that the west abutment was founded about 30 ft. and the east abutment about 20 ft. above the rock. About 30 piles were driven to the gravel under the west abutment and in each case it was impossible to penetrate further. The piles were badly broomed at the ends and several were broken and sheared off below the surface. It was therefore deemed unwise to proceed with this construction and arrangements were made to excavate to rock. For this purpose 40 ft. lengths of Lackawanna steel sheet piling, with $\frac{1}{2}$ -in. webs, were successfully driven to rock on the outside lines of the abutment. The south half of the abutment was first completed to provide means for bracing the old masonry during the construction of the north half. This method of carrying on the work is shown in the accompanying drawing. Before making

the excavation trestle bents were placed under the present tracks in order to relieve the old masonry as much as possible.

A slight settlement of about four inches was noticed in one end of the old abutment, but nothing more serious resulted. A great deal of water was encountered in the excavation and much

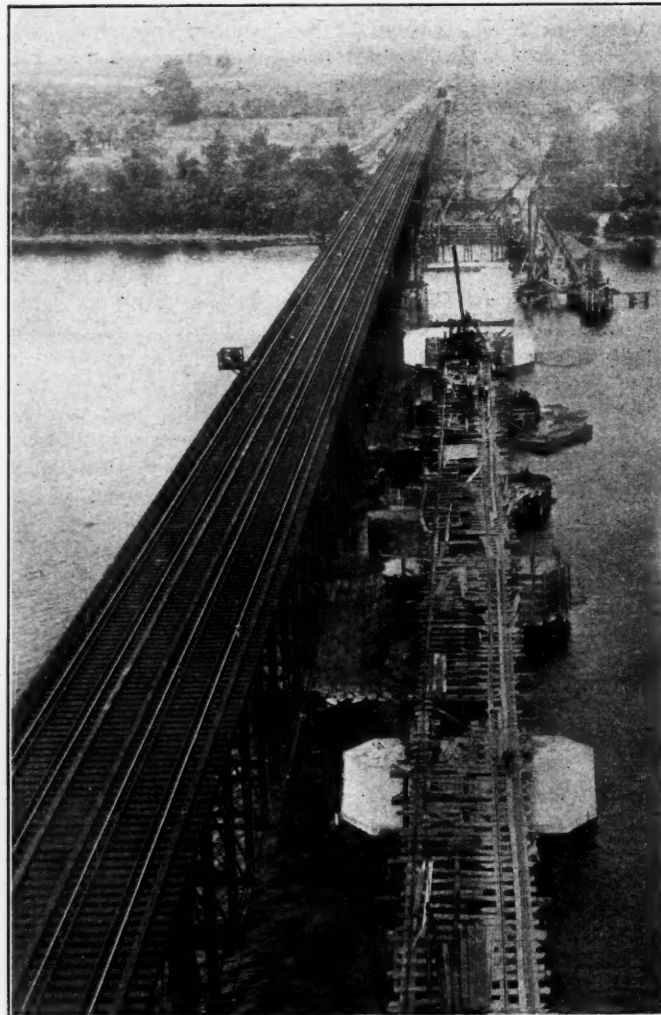


Fig. 4—General View of Work on the Pennsylvania Side.

of it had to be raised about 42 ft. One 10-in. and one 6-in. centrifugal pump were used in unwatering the excavation. These were set about 18 ft. above the bottom and the discharge was piped about 24 ft. to the top of the excavation.

No attempt was made to drive concrete piles at the east abut-

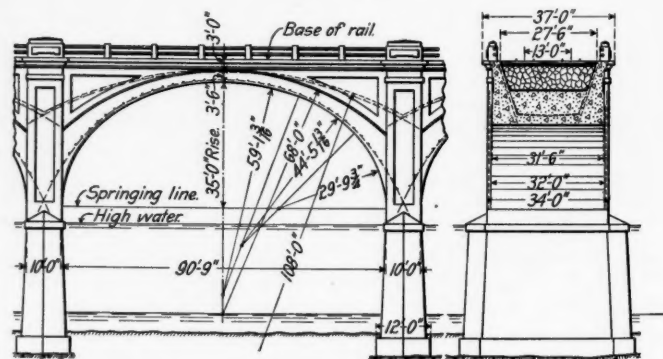


Fig. 5—Elevation and Section of 90 ft. 9 in. Arch of Bridge.

ment and the same method of construction was used as at the west abutment to carry the foundation to bed rock. Steel sheet piling of the Lackawanna pattern $12\frac{3}{4}$ in. wide with $\frac{3}{8}$ -in. web

and 18 ft. long was used for all the coffer dams in the river.

The wooden piles for the construction trestle were driven so as to provide anchorage for the 12-in. by 12-in. timber templates, placed near the water level, around which the steel piling was driven. These templates corresponded to the outside lines of the masonry, the ends being made semi-circular, to form a continuous line of locked sheet piling. The piling was set up against the

gravel and silt along the outside of the joints, which assisted very materially in closing up any leaks through them.

The excavated material was placed on the outside of the dams, which also aided in reducing the leakage. As the excavation progressed additional timbering and bracing were placed to support the sides of the dam. Although the piles in many instances penetrated the top strata of the shale rock 12 to 18 in. a great deal of water came into the dams at the bottom of the piling and interfered with the placing of the foundation concrete. The dams were about 24 in. wider than the neat foundation lines of the piers and this space was taken advantage of in leading the water around the outside of the concrete to the pumps at the end of the dam. This was accomplished by leaning a form of two planks in height against the steel sheet piling leaving a space of about 12 in. at the bottom for the excess water.

Sufficient 18 ft. steel piling was purchased to cover five dams, or about 11,466 lineal ft. The first driving of five coffer dams, required about 11,160 lineal ft. The second driving of five dams required 10,980 lineal ft. and the third driving 11,460 lineal ft., or a total for the work of 33,600 lineal ft., showing that most of the piling received was used three times. With the exception of a section of the dam at pier 13 which was allowed to remain to protect the bank of the Trenton Water Power canal, all the 18-ft. lengths of piling were recovered. The loss to the contractor by reason of the steel splitting open, bending or otherwise becoming damaged so as to be worthless for further use, did not exceed five per cent. of the total, so that of the 637 pieces brought on the work 600 were recovered and were available for use on other work.

FORMS.

Great care was exercised in the construction and bracing of the forms and no materials were spared in their design, the justification for which is shown by the very small percentage of failures during the work. These were very slight and of minor importance, although a failure in any of the umbrella forms might have been disastrous. As it was, no movement has been noticed during construction.

The forms for the piers were made up in sections measuring about 12 ft. x 16 ft. They were composed of 8-in. x 10-in. horizontal timbers, spaced about 2 ft. center to center, well bridged, with two thicknesses of 1-in. by 8-in. boards, placed diagonally, for the lagging. Upon the face of the lagging was tacked No. 22 galvanized sheet iron. These forms were assembled on the shore and placed in position with the derricks. They were held in position with $\frac{3}{4}$ -in. rods and 4-in. by 6-in.

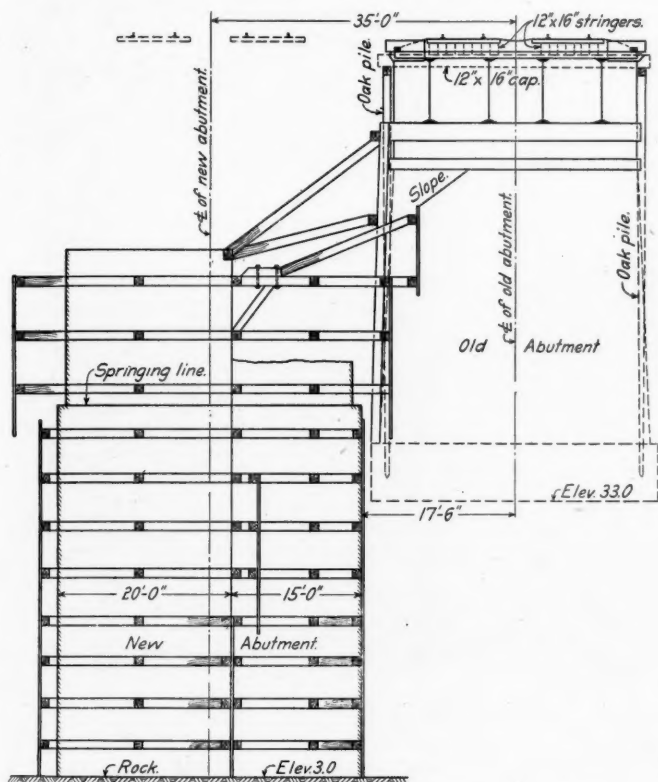


Fig. 6—Method of Supporting Old Pier During the Construction of the New One.

timber template, which also served as wales, by the traveling crane or a stiff leg derrick and was then driven to rock by means of a "New Monarch" steam hammer having a steam cylinder $6\frac{1}{4}$ in. by 14 in. and weighing about 4,200 lbs.

The material in the river bed overlying the rock was a heavy gravel, sand and boulders for an average depth of 8 ft. The



Fig. 7—View of Piers and Umbrella Forms.

depth of water at the summer stage ran from zero to 6 ft. Most of the unwatering of the coffer dams was done with two 6-in. pumps. Some difficulty was experienced at first in lowering the water, as a depth of several feet of water was in direct contact with the outside of the piling, causing considerable leakage into the dam. This was checked by placing burlap bags filled with earth against the outside of the piling, which proved very effective. Long wire rods were also used to puddle the

spreaders across the pier. Attached to the ends of the rods were wrought iron swivels, receiving the square nuts of stub bolts, which passed through the forms to outside waling pieces. The stub bolts extended several inches into the concrete and were removed to release the forms, leaving the bolt holes in the concrete to be closed with mortar. This avoided the necessity of cutting bolts and kept all iron well back from the face. The forms were adjusted to line at the top by turnbuckles at-

tached to the 2-in. by 2-in. by $\frac{3}{8}$ -in. angle iron cross braces which were anchored into the lower section of concrete previously placed.

The ribs for the umbrella forms were composed of two pieces, 2 in. by 8 in., spaced about 2 ft. center to center, with 8-in. by 10-in. wales, spaced about 4 ft. center to center and secured to

the concrete to the back of the arch. The coping of the piers was reinforced with T rails to take the thrust of the loaded centers. At the middle the centers were supported by timber towers measuring 21 ft. by 33 ft. at the base and founded upon 14 timber piles. Four sets of oak wedges were used under each rib, the ribs being built in half sections for ease in erection. All

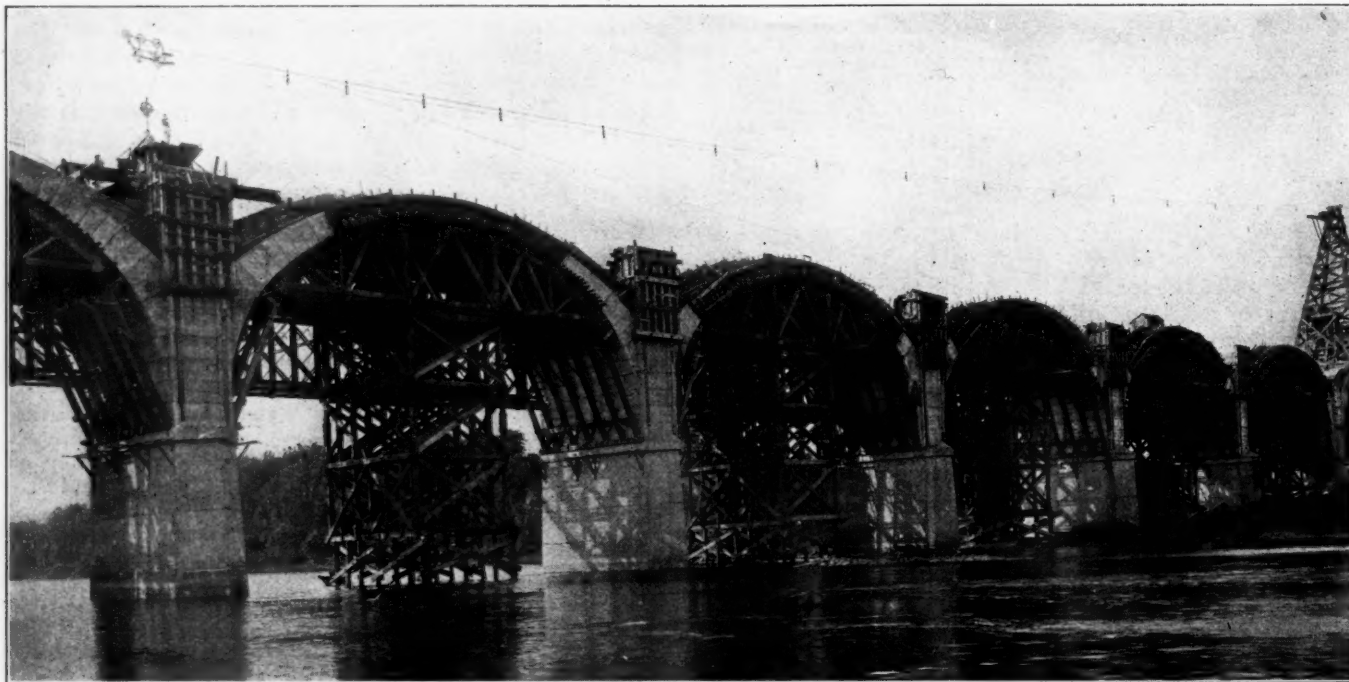


Fig. 8—Looking Upstream, Showing Arch Centering and Forms.

the ribs with $\frac{3}{4}$ -in. iron stirrups. The lagging was of 2-in. by 6-in. timbers. Practically the same method of inside bracing was used as for the main pier forms, except that it was heavier and closer together.

The main centers had a clear span of about 70 ft. and were

the forms and arch centers were of short leaf yellow pine and were designed by the contractors. The concrete in the bridge was of two classes, 1:2:4 and 1:3:6 mixtures. A 1:2:4 mixture was used in the first 4 ft. of the foundations. From this point to the springing line of the arches the mixture was 1:3:6. The arches and spandrel walls were of 1:2:4 mixture. Embedded stones were allowed in the foundations and piers, but not in the arch rings or spandrel walls. One or two man size stones were used



Fig. 9—Arch Centers and Falsework.

made up of seven ribs supported at the ends on inclined timber bents resting on the coping of the piers and suspended from the umbrella section by means of seven $1\frac{1}{2}$ -in. rods passing through

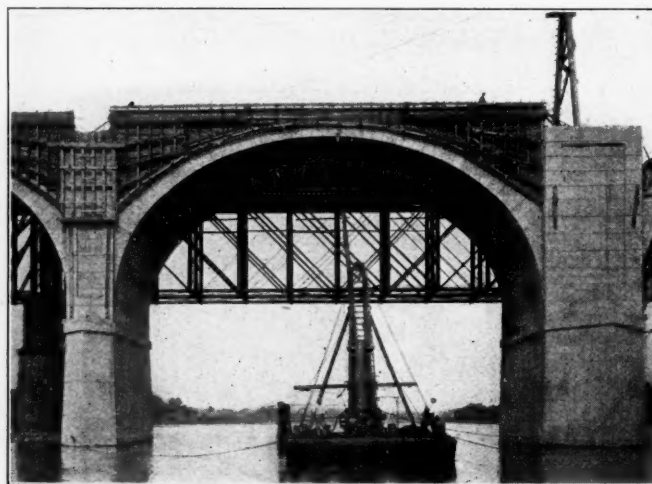


Fig. 10—Spandrel Wall Forms.

for this purpose, procured from a local quarry for the New Jersey side of the bridge and limestone for the Pennsylvania side. The quantity of stone used varied in different portions of the work, depending upon the convenience to the stone piles and the ability of the derricks to handle the concrete and place it in the forms as fast as it reached them from the mixer. As it was necessary to use the same derrick for both concrete and

stone, the stone was placed when convenient, the concrete having the preference. The coping was composed of a 1:3:6 mixture and the railing posts of a 1:2:4 granolithic mixture. The stone for the posts was of ¼-in. size trap rock, cleaned of dust.

Dragon cement was used throughout the structure and every car received at the work was sampled and the sample forwarded to the company's laboratories at Reading, Pa., for testing. The following table shows the average result of 40 tests:

Residue, No. 100 Sieve. Per Cent.	Residue, No. 200 Sieve. Per Cent.	MgO. Per Cent.	SO ₃ Per Cent.	Specific Gravity.	Initial Set. (Hours)	Hard Set. (Hours)	Steam and Hot Water Test.	Tensile Strength— Neat Test		
								One Day. (Lbs.)	One Week. (Lbs.)	1-3 Sand. One Week. (Lbs.)
4.74	21.48	2.42	1.846	2.15	2.6	6.43	O. K.	472	698	357

The sand used for the concrete in the Pennsylvania side of the bridge was a well graded bar sand dredged from the Delaware river near Burlington, N. J. That used for the New Jersey side was a bank sand from Birmingham, N. J. Freight rates influenced the contractors in using the two different sands. The following tables show analyses of the sands:

Tensile Strength (1-3 Mortar)						
Ottawa Sand. 7 days. (Lbs.)	Sample. 7 days. (Lbs.)	Per Cent. Ottawa Sand. 7 days.	Voids.	Weight per cu. ft. (Lbs.)	Per Cent.	
					Silt.	
Delaware river bar...	399	279	70	44	94 11/16	1.5
Birmingham bank	419	310	74	40.1	92 8/16	2.8

GRANULOMETRIC ANALYSES.									
Per Cent. Passing Sieves.								Retained on	
No. 200	No. 100	No. 80	No. 50	No. 40	No. 30	No. 20	No. 10	No. 10	No.
Delaware river bar...	0.9	1.3	1.4	21.8	18.1	23.5	16.7	16.3	19.9
Birmingham bank....	1.4	8.9	9.2	23.8	10.5	12.5	15.7	18.0	0.5

While the specifications called for crushed stone to be used in all concrete, the contractors were allowed to use river pebbles

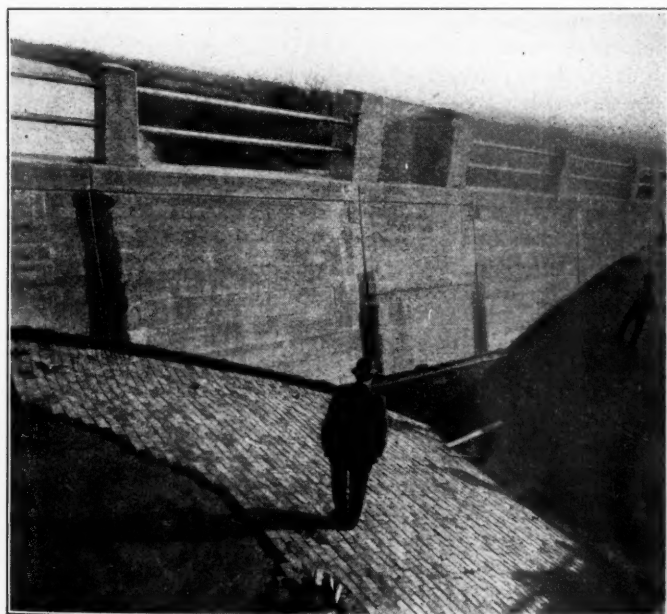


Fig. 11—Waterproofing Over Arches and Brick Covering.

for the Pennsylvania side of the structure. These were well graded in size from ¼ in. to 1¼ in. Crushed stone was used for the New Jersey side ranging in size from 1¼ in. to a small percentage of dust, being the run of the crusher.

CONCRETE SURFACE AND CONSTRUCTION.

In constructing the piers and the umbrella sections the work was so arranged as always to stop the day's work at the inner edge of a triangular wooden fillet or scoring, 1½ in. wide, in order to hide as far as possible any irregularity on the surface.

The sections between scorings were so designed as not to be more than the day's capacity of the mixing plant and also with a view of avoiding night work.

On the face of the pilasters and umbrella sections, the scoring was closer together than on the piers and coincided with the scoring of the arch rings. There were 18 of these in the umbrella section, and the arch ring between the umbrella sections was divided into 35 voussoirs by the scoring. Fillets were used

at the exposed corners of all contraction joints and on all salient corners.

The exposed faces of the concrete throughout the structure were spaded, with the exception of the railing posts, which were bush-hammered. The spading against the metal lining of the forms produced a very smooth and uniform surface. The specifications called for a granolithic finish throughout, to be scrubbed and washed, exposing the grit, or to be bush-hammered if the contractor so desired. The change in the specifications to a spaded face was granted at the solicitation of the contractor, who agreed to give a finish equal to the granolithic finish in appearance and uniformity of color and surface.

In building the umbrella sections they were carried up in sections corresponding to one or more of the face scorings. The arch ring was divided into six large sections or voussoirs, three on either side of the key and the key section, which was about two ft. wide. Two opposite sections amounted in contents to about 10 hours run of the mixing plant. Corresponding with the joints between the ring sections, were vertical joints through the spandrel walls extending through the coping, providing weak joints in case of any tendency to open up on account of shrinkage or temperature changes. Tongued and grooved joints were used in every case. In order to prevent the bonding of one section with another and to form a cushion between them, corrugated asbestos boards were placed on the faces of the joints. In the joint at the junction of the spandrels and pilasters a double thickness of boards was used.

As the main centers were designed for a loading equivalent to a thickness of the showing ring, the entire ring for this thickness was first completed and keyed up, after which the haunching was placed. This was kept 2½ ft. back from the showing face, thus bringing the extradossal joint between the spandrels and arch ring at the top of the projection of the rings.

The skewback for the main arch ring was formed by the radial line passing through a point on the intrados, 15 ft. measured horizontally from the center of the piers. The portion of the arch below this skewback—called the umbrella—was constructed as a part of the pier. The sections of the ring were built in pairs one on each side of the crown, in order to balance the horizontal thrust on the centers. They were constructed continuously from start to finish, so as to avoid any intermediate joints. Fortunately nothing occurred to prevent the carrying out of this method.

The turning of the arches began with the arch adjacent to the center pier after the centers for four arches had been placed in position. The first two voussoirs cast were those at the crown of arch 7. The next pair placed were those at the crown of arch 6. This was done to weight down the centers at the middle and also to obtain the maximum settlement in the centers at this time. In arch 6 it was done to add weight to its center that it might better take any horizontal thrust while the sections at the skewback of arch 7 were being placed. This rotation was carried through the construction of all the rings. The haunching was not placed until the key section had received a hard set. The centering was required to be maintained under the completed arch ring for at least 30 days.

In framing the centers they were given an additional height

at the crown of about $1\frac{3}{4}$ in. above the plan height to allow for any compression in the centers and in anticipation of some settlement after they were struck. Levels were taken on the centers before and after completing the crown sections; on completion of the haunch blocks; on completion of the key; and before and after striking the centers. The greatest deflection was at the time of completing the crown sections, which ran from .05 to .13 ft. In the first centers that were built an attempt was made to obtain the additional height at the crown by manipulating the wedges, but this proved unsatisfactory. The remaining centers were then framed so as to give the required $1\frac{3}{4}$ in. additional height at the crown. Most of the arches deflected so as to be about $\frac{1}{4}$ in. below the plan elevation at the crown after striking the centers and four were $\frac{1}{4}$ in. higher.

The spandrel walls were completed after the centers were dropped. On account of the liability of a side movement in the spandrel walls during construction the coping was not constructed until after the spandrels for each arch had been entirely completed and the concrete had received a set. The posts for the railing were all cast in place. The total quantity of concrete of all kinds in the bridge is 34,670 cu. yd., made up of the following materials, viz.:

Cement	42,363 bbls.
Crushed stone and pebbles.....	37,172 tons
Sand	21,954 tons
Imbedded stone	2,558 tons
Steel reinforcement	262.5 tons

The total area of surface to be waterproofed will amount to about 42,000 sq. ft. and the stone spandrel filling will amount to about 7,500 tons. There were used for construction purposes about 1,400,000 ft. b. m. of lumber, 800,000 ft. of which was required for the centering of the arches.

The construction work was carried on under the direction of the Philadelphia & Reading, William Hunter, chief engineer, the writer being in direct charge.

CONDITION OF SAFETY APPLIANCES.

The following data as to the condition of safety appliances is taken from a report to the Interstate Commerce Commission made by H. W. Belnap, chief inspector of safety appliances. It was accompanied by several tables which are not reproduced. One of them showed in detail a statement of all penalties, exclusive of costs, which have been collected under the safety appliance, hours of service and ash pan acts, as of November 1, 1912. It shows that a total of \$259,900 has been collected from 204 roads for violations of the safety appliance law, an average of \$1,274 per road. For violation of the hours of service law \$40,921 has been collected on account of trainmen, \$11,715 on account of telegraphers, and \$500 because of failure to file reports. For violations of the ash pan law \$3,400 has been collected.

The following extracts are quoted from Mr. Belnap's report: In submitting the data showing the condition of safety appliances in general for the past fiscal year, I have the honor to report an apparent increase in the number of defects noted as to freight equipment and locomotives and a decrease as to such defects in passenger equipment. This increase, however, with respect to freight cars and locomotives is due to the fact that the report for the fiscal year ending June 30, 1911, comprehended only 83 classes of defects, whereas this report covers inspections made pursuant to the commission's order of March 13, 1911, and includes an aggregate classification of 230, or an increase of 147 different kinds of defects. The decrease in the number of defects reported as to passenger cars shows a high degree of efficiency in the maintenance of safety appliances on this character of equipment.

The number of defects reported on freight and passenger cars and locomotives is 73.45 per thousand inspected, while the number of such cars and locomotives found to be defective is 61.45 per thousand inspected. Defective lock blocks represent the majority of defects under the heading "couplers and parts," there being 1,993 such defects out of a total of 3,000 coupler

defects reported. The uncoupling chain is the most prolific cause of defects to uncoupling mechanisms, as out of a total of 4,071 defects of this character 2,324 cover defective chains. As to the 16,442 defects to air brakes, 9,774 such defects were due to air brakes being "cut out" and inoperative, or to the fact that there was no stenciled date to indicate that the cylinders and triple valves had been cleaned within a year. Under the heading "handholds" a total of 3,917 defects were reported, of which 2,409 were missing handholds. The most numerous of the defects to running boards consist in the insecurity of the running board brace, 1,209 out of a total of 2,174 defects to running boards being of this character.

It is to be particularly noted that out of a total of 4,965 defective hand brakes reported, 2,630 were caused by the cotter key or ring at the bottom of the brake shaft being missing. The foregoing instances are enumerated for the purpose of showing that the great majority of the defects reported comprehend a comparatively small number of appliances, and it is believed that if the railroad repair men would familiarize themselves with the defects, especially those just indicated, and would make a special effort to reduce the number of such defects, a very short period of time would suffice to bring about a much improved condition.

The committee appointed by the Master Car Builders' Association, for the purpose of adopting a standard coupler, is conducting an investigation with a view to securing a coupler which will combine the maximum of efficiency with a minimum number of parts, of simple construction and easily repaired. When this committee shall have designated a coupler, if the carriers will adopt it as the standard coupler, the number of defects to couplers will be reduced to a minimum. The Master Car Builders' Association is to be commended for its action in this matter, as the adoption of a standard coupler will tend not only to reduce the number of accidents resulting from defective couplers, but should ultimately redound to the material advantage of the carriers themselves from the standpoint of economical maintenance.

It is recommended that the commission take such action as will require the carriers to report semiannually the progress made in the equipment of freight and passenger cars with the new standards. From information thus far received it is apparent that unless this work is greatly expedited it will not be completed within the time required by the commission's order.

In many instances our inspectors have found that the only test made of the efficiency of the train brakes is one intended to show that the air is working throughout the train line. Under such a system of inspection the train crew has no means of knowing the actual condition of the air brakes. Such practices cannot be too severely condemned, as the several trains on any railroad are not independent in point of movement and safety, but are interdependent, and whatever brings delay or disaster to one train, or results in disabling one of its operatives, impedes the progress and imperils the safety of other trains. Our inspectors have frequently made terminal tests which disclosed the fact that the proportion of operative air brakes on trains about to leave their terminals was less than the percentage required by law. Had these trains, in fact, left their terminals in that condition, our inspectors, in the performance of their duty, would have been compelled to file evidence of such violations of the law for prosecution. However, the train crews being present at the time such inspections were made, and realizing the imminent danger to themselves and to opposing trains, the matter was promptly reported to the officials in charge, by whom the necessary repairs were ordered. In such instances inspectors have occasionally been charged with holding the train and causing delays. In this connection it should be understood that inspectors always make their terminal tests in conjunction with the train crews and at the same time, thereby causing no direct delays, and they have in no instance held a train longer than was necessary to make the test, which ordinarily consumes only 5 or 10 minutes. A terminal or standing test of power brakes should be made on all trains before permitting them to leave their terminals. This method of inspection cannot be too highly

recommended as a means of ascertaining the true condition of air brakes.

The question as to the right of a railroad to handle equipment defective in the matter of safety appliances has occasioned more controversy than any other part of the act of April 14, 1910. This portion of the law, however, will receive judicial interpretation within the next few months, as a number of cases involving the handling of chained-up cars, and cars with defective safety appliances hauled out of repair points for the purpose of repairs have been filed for prosecution in the several judicial districts.

The impression seems to obtain very generally that inspectors have the authority to shop cars if they should find that any of their safety appliances are defective. This is an error, and is without foundation, as none of our inspectors has ever ordered a car to be taken out of service, regardless of the number or the serious nature of its defects. The law merely authorizes inspectors to make inspections and to file evidence with the commission of any violations of the law with come within their personal knowledge.

In conclusion, it may be observed that in view of the large number of appliances covered by our present system of inspection, the splendid showing made by the majority of the railroads in the maintenance of those valuable safeguards is truly gratifying.

DEPUTY INTERSTATE COMMERCE COMMISSIONERS PROPOSED.

T. J. Norton, general attorney of the Atchison, Topeka & Santa Fe, in a letter to the *Traffic World*, advocates the creation of deputy Interstate Commerce Commissioners to hold hearings in various places throughout the country, to relieve the Interstate Commerce Commission of many of the details for which it is now responsible, and to hear minor cases subject to appeal to the commission. Mr. Norton's letter is as follows:

"While so many others are expressing their views as to how the burden upon the Interstate Commerce Commission may be lightened, I should like to offer an opinion based upon many years of practice before that body. I do this because I think some of the plans suggested would needlessly unsettle conditions which have grown stable and which should not be disturbed. When a practice has become settled and well understood by all concerned it is not wise, just because some little alteration may be necessary, to change it fundamentally, any more than we should pull a house to pieces when we find it necessary to cut a new window or to make some other change suggested by trial.

"My idea is that by one short paragraph of amendment to the interstate commerce law all that is now lacking in a well-ordered and well-tried system can be provided.

"No one acquainted with the work of the Interstate Commerce Commission can doubt for a moment the pressing need of giving relief to that body. It has to look after the details of many informal cases in which important contentions are disposed of without formal trial. It makes rulings in response to almost countless inquiries by mail. It has passed up to it for examination the enormous trial records of a multitude of cases. In addition to its work in looking after litigated business, it is required by Congress to give effect to the safety appliance laws, to investigate and keep a record of all accidents, to effectuate the medals of honor act for the recognition of those who endanger their lives in saving others in time of wreck or disaster, to enforce the hours of service law and the ash pan law, to regulate and supervise the transportation of explosives, to effectuate the boiler inspection act, to supervise the charges and practices of the Lake Erie and Ohio river ship canal, to carry out the purposes of Congress in the supervision of traffic through the Panama canal, and finally, to supervise the classifications and rates under the act establishing a parcel post.

"Clearly that is as much as one body should be called upon to do, if not more than it can handle.

"Those administrative matters render it impossible for the commission to give the time and reflection to important litigated

cases which it would give to them in other circumstances and which they certainly should have. In addition to this the commissioners would like to try more cases than they do instead of assigning them to examiners. Assuredly the litigants would be greatly pleased to have more of the larger cases tried by the commissioners themselves.

"Another thing taking the time of the commission is the oral arguments of cases, which now occupy something like one-half of each month. Formerly oral arguments were few; but it is now believed by both the commissioners and the parties that, in view of the congestion described, the best presentation of the subject calls for oral argument, for otherwise some of the commissioners might not become fully acquainted with the case. There are general conferences several days each month, and there are also numerous special conferences. How give relief?

"Let Congress create deputy commissioners to sit throughout the country somewhat as district judges hold court, with authority to try cases and decide them and with the right of the losing party, if he believes that he has not received his due, to appeal to the central commission at Washington, that appeal to be based on exceptions to the findings of the deputy commissioner as not being supported by the evidence, thus giving a trial *de novo* on the facts. The central body would go over the record as criticized by the appellant, and would either affirm the order of the deputy commissioner or else enter such order as it might deem appropriate. My observation has been that the dissatisfaction of both the shippers and the carriers has been with respect to the inability of the parties to get further hearing on the facts. Under late decisions the shipper cannot go up from the commission even on the law. Bills have been introduced in Congress to alter this condition. But there will not be any law to speak of in these cases after there has been a thoroughgoing trial on controverted facts. An important case tried by a competent deputy commissioner and then reviewed by the central commission would be decided as nearly right as men could expect to have a case of disputed facts determined. Of course only the heaviest cases would ever go above the deputy commissioner. The findings of the deputy commissioner who heard the witnesses would be very suggestive and serviceable to the central commission, and the commission would in all probability smooth out many irregularities passed up by the deputy commissioner, so that finally we should have the best conclusion that could be expected.

"Such a plan would not only remove from the back of the commission as it exists now a great part of the enormous work attendant upon litigation, but it would also conduce to more thorough trials, which means more satisfactory work to all concerned, to the commission as well as to the litigants.

"The deputy commissioners should be well paid. The salaries should be such as to invite thoroughly competent men to seek the places. They should either know the leading rules of evidence or else the commission should formulate a code for their guidance, for the laxity in this regard has become intolerable and grossly expensive to the parties. Besides, the late decisions governing the review of evidence by the courts makes necessary a reasonably close adherence to the law of evidence. In some traffic centers more than one deputy commissioner would be required. Chicago might need two or three. Just how many would be necessary and where they should best be stationed would be determined shortly by experience.

"This improvement could be provided for by a single short paragraph and without any change in the substantive law as it stands today. Let the president or the commission appoint the deputy commissioners for a statutory term and let them be assigned by the chairman of the commission to duty in the parts of the country where they may be needed. We shall then have better trials, an opportunity for review, which is now practically denied to both shippers and carriers, the benefit in the more important cases of the more thorough consideration of the central body, and altogether a disposition of this business with a care more nearly commensurate with its importance to the litigants and to the country."

FUNDAMENTALS OF WAGE PAYMENT.

All Systems, Properly Administered, Are Equally Effective—
The Time Element Is All-Important Under Any System.

By B. B. MILNER.

Frequent argument that there exists such a great difference in the efficacy of various wage payment systems as factors in efficient management, warrants the following, which has been written with the idea that a more definite understanding of the very simple relations which exist between the basic elements concerned in the various systems of labor payment and which can so readily be obtained, will show: (1) that the selection of the type of wage system is not so vital as very popularly supposed and argued; (2) that under uniformly efficient administration the differences between them are more largely imaginary than real; (3) that, under any system of labor payment, efficient management and administration involves constant attention to important elements common to any of the many systems.

In the consideration of labor costs three elements are fundamental and inter-dependent; namely, the labor cost of production per operation (identical with the workman's earnings per operation); the rate of the workman's earnings per hour, and the time consumed per operation. These will hereafter be referred to as "Cost," "Rate" and "Time," respectively. The time consumed per operation should be understood as that of, not the unusually skillful and rapid workman, nor the one lowest in the scale of skill and speed who is qualified to satisfactorily perform the work, but of an average workman who occupies a position

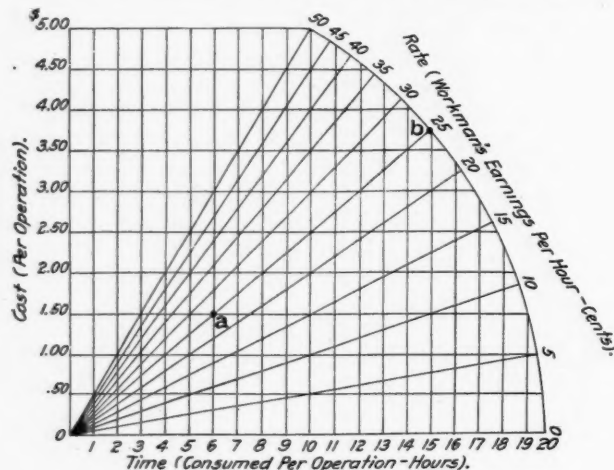


Chart 1.

between these two extremes. The relations existing between the elements, cost, rate and time, are expressed algebraically by the following equation:

$$\text{Cost} = \text{Time} \times \text{Rate}$$

so simple in application that, having given any two, few workmen are unable to determine the desired third. The same relations may be represented advantageously by Chart 1; which geometrically interprets the equation:

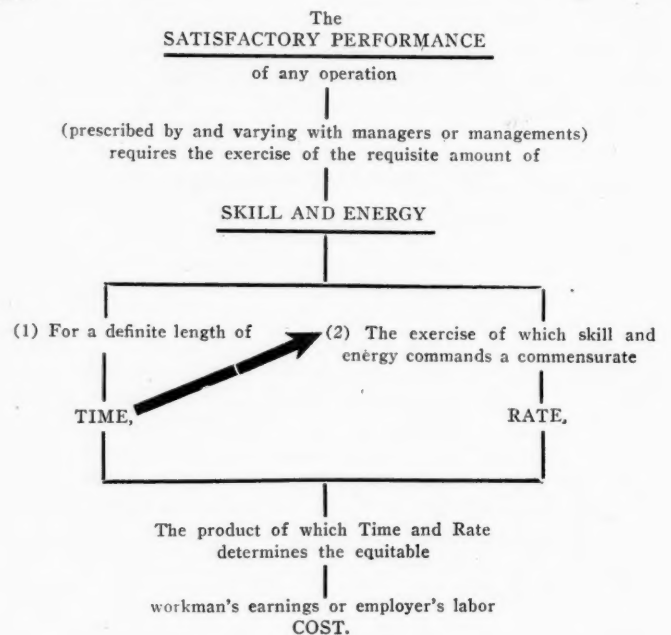
$$\text{Rate} = \frac{\text{Cost}}{\text{Time}}$$

obtained from the first equation by transposition and division of both its members by "Time."

Within the range of values exhibited by the three scales, having given any two of the elements (Cost, Time and Rate), the third may be immediately found therefrom. For example, a workman's rate of earnings per hour may be immediately determined as 25 cents, when he has earned \$1.50 in six hours, by locating the point of intersection *a* of the lines representing the given cost and time and following the rate line from this common

point of intersection to the rate scale at *b* where the desired rate will be indicated as 25 cents per hour. Similar charts for any range of cost, time and rate values may, of course, be easily constructed.

In order to be more specific, throughout the following discussion, we will assume an operation, the "satisfactory performance" of which requires ten hours of time, and for which the "commensurate rate" is 30 cents per hour as shown by Chart 2. The following graphical statement defines the relative meanings attached to the terms satisfactory performance, skill and energy, etc.:



The day work wage line of Chart 3 is the locus of all points on the chart representing the relations existing between time, cost and rate, under the day work system. Note that the cost (per operation to the employer) rises and falls with increases and decreases in time (consumed per operation) and that the (employees) rate (of earnings per hour) remains constant at 30 cents an hour for all values of cost and time.

The employer was opposed in stimulating his employees to the point of satisfactory performance by the ordinary worker's tendency to do no more than actually required of him. This tendency was aggravated under the day work system by the fact that the employee does not participate in the profits accruing from increased output as evidenced by the uniformity in the employee's rate of earnings per hour. The employer therefore conceived the idea of paying for labor by the piece, expecting therefrom a considerable reduction in his labor costs, which he may have thought or known were high and, at the same time, relief from having to so closely supervise his workmen in order to obtain a satisfactory performance.

The piece-work wage line of Chart 4 is the locus of all points in the chart representing the relations existing between time, cost and rate under the piece-work system. Note that the cost per operation to the employer remains constant at all values of the employee's rate of earnings per hour and time consumed per operation, and that the employee's rate rises and falls with decreases and increases with the time consumed per operation.

The labor cost per operation to the employer is uniform, and all profits accruing from increased output revert to the employee,

being reflected by variations in his rate of earnings which follow directly the increases or decreases in output. The employer was not disappointed in what piece-work actually did for him, and was largely relieved of the necessity of crowding workmen because of their being now personally interested in their own output. We would actually expect that the output of the workmen should now have been limited only by their capacity, but conditions soon developed which materially affected the actual output of piece-workers and necessitate qualification of the statement that the piece-work system has been satisfactory. These apparently un-

may be so low that it will not pay a satisfactory wage, that is, commensurate with the skill and energy which must be exercised to satisfactorily perform the operation. However, very early in his piece-work experience the workman learns that, by exceeding a certain rate of earnings, i. e., the "commensurate rate," he exposes and demonstrates the equity of a lower piece-work price and that it is therefore to his personal interest, in the effort to obtain as high a wage as possible with the minimum amount of exertion, to guard and protect his piece-work price from any cutting readjustments, by limiting his output to that which will,

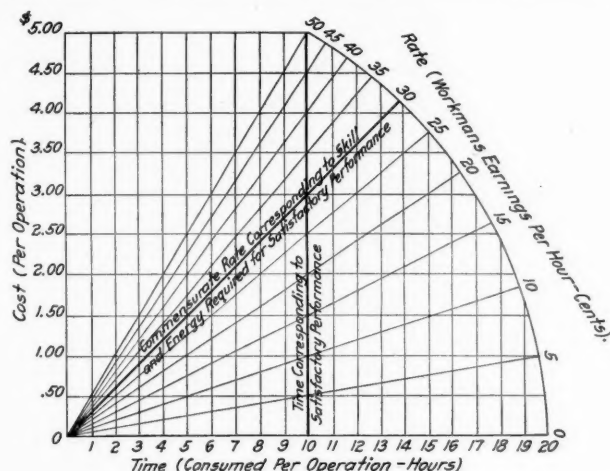


Chart 2.

foreseen factors affecting the output have been two, namely, (1) the decreasing amount of effort which workmen will exercise as their rate of earnings increase (in accordance with the economic law of decreasing returns under which, after a certain amount of energy has been expended and a corresponding compensation earned, the workman's desire to earn decreases at a rate varying with the personal characteristics and the needs of the individual); and (2) the possibility of readjustment or cut in the piece-work price as the result of high earnings. The workmen soon learn by experience or are taught by their fellows that this readjust-

at the prices quoted, pay him a rate commensurate with the skill and energy which he is expected to exercise.

The difference between Charts 5 and 6 is that the zigzag line *a b a' b' a'' b''* of Chart 6, interprets the performance of experienced piece-workers who so limit their output that their earnings at no time exceed the commensurate rate.

The difficulties outlined as having been experienced with piece-work operation and having made of it "high priced day work," are ultimately most largely dependent upon inability or failure to locate accurately the time actually required for satisfactory per-

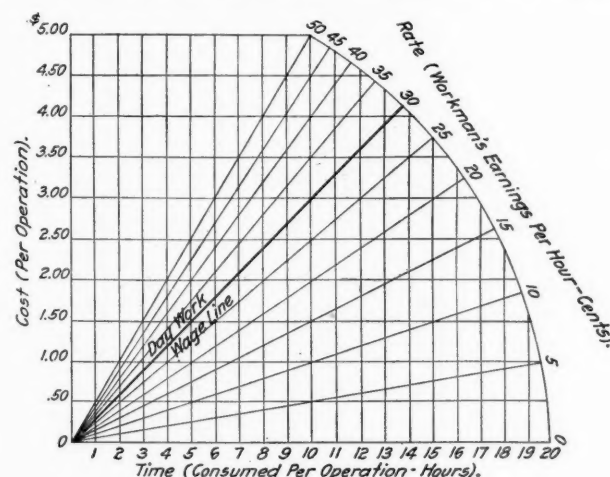


Chart 3.

ment of a piece-work price is apt to follow any demonstration that a lower price will still permit the earning of wages much above that usually paid similar labor.

The zigzag line of Chart 5, *a b a' b' a'' b''* shows graphically the usual history of piece-work operation where the prices originally quoted were too high, and have resulted in earnings higher than those commensurate with the skill and energy required for the satisfactory performance of the operations. Successive demonstration of that fact has resulted in piece-work price adjustments (reductions) at points *b* and *b'* until the final price

formance and to use it and the commensurate rate as the basis of the piece-work price originally quoted.

Any system of labor payment should be based upon the payment of an honest wage for honest performance, and a definite understanding should exist between employee and employer that the employer expects the skill and energy required for the satisfactory performance to be honestly exercised. For this he expects to pay a commensurate rate of earnings. On the other hand, the employee will certainly expect to receive the commensurate rate for satisfactory performance regardless of the

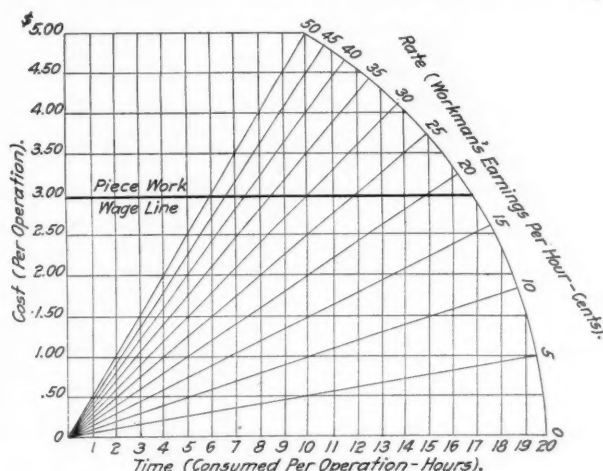


Chart 4.

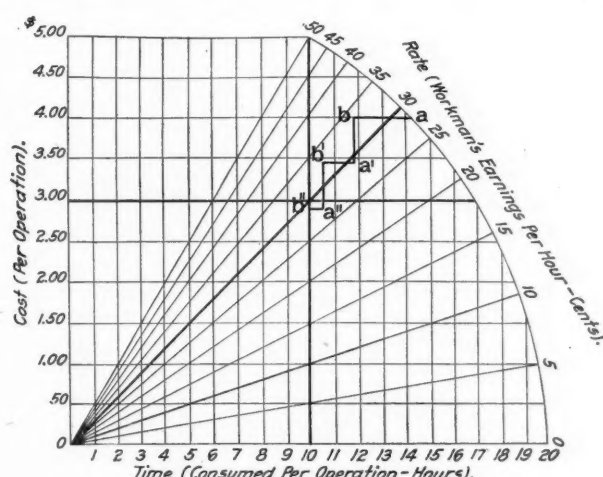


Chart 5.

system of labor payment under which the work may happen to be performed. Consistent with this a satisfactory piece-work price (Cost) must equal the product of Time (actually required for satisfactory performance) and Rate (commensurate with the degree of skill and energy required for satisfactory performance), and it should be definitely understood that changes in piece-work prices can only be justified by, and must be expected to follow, changes in either or both of the co-ordinate component elements, i. e., time (a function of methods and conditions under which the operations are performed) and rate.

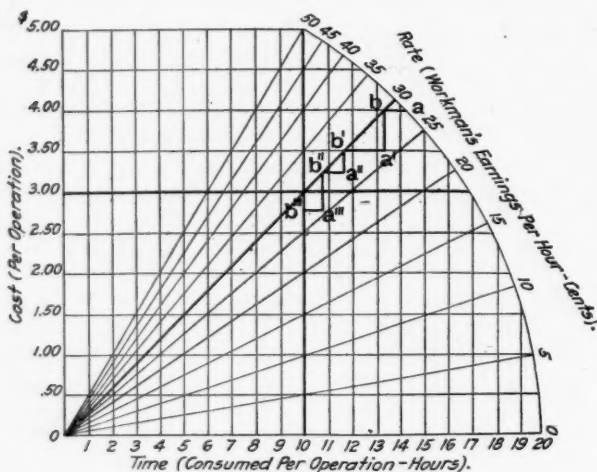


Chart 6.

Such understandings and methods of procedure consistent therewith should more nearly bring for the piece-work system that which was expected of it, viz.: (1) a lower labor cost, (2) an output limited more nearly entirely by the employee's individual capacity, and for him, (3), a rate of earnings proportional to his output and considerably higher than paid under the day work system as usually administered.

Chart 7 shows clearly the relations existing between the piece and day work systems when the conditions referred to have been fulfilled, the shaded portions of the chart representing the labor

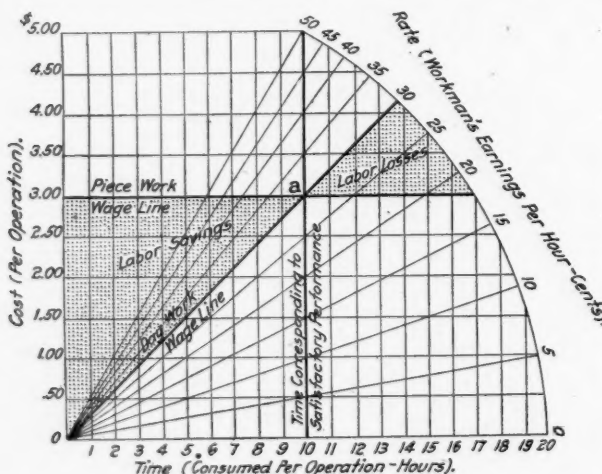


Chart 7.

savings and losses accruing from increasing or decreasing output above or below that represented by satisfactory performance. Note that, for time corresponding to satisfactory performance under either piece-work or day work, cost and rate are identical and that, under the day work system, all labor savings resulting from increased output revert to the employer by whom all labor losses resulting from decreased output are assumed and that the employee's rate remains constant, while under the piece-work system, all labor savings resulting from increased output revert to the employee by whom all labor losses resulting from decreased

output are assumed, the employer's cost remaining constant. Under no system of labor payment does cost per unit of output regularly increase with increases in output or decrease with decreases in output; likewise, under no system does rate decrease with increases in output or increase with decreases in output. The piece-work and day work systems represent then extremes of liberality and exactitude toward the employee at his varying rates of output; in other words, no system is more liberal to the employee where output is high, or more exacting where output is low, than piece-work and, on the other hand, no system is

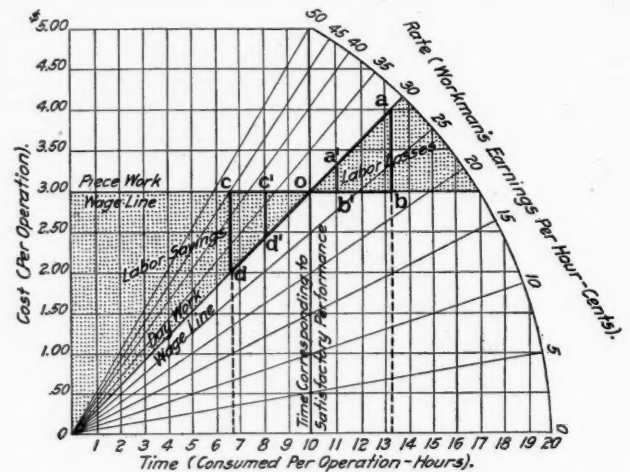


Chart 8.

more liberal to the employee where output is low or more exacting where output is high than day work.

Between the two extremes represented by day and piece-work, there are many systems, premium, bonus, profit sharing, etc., which may be generally classed as "divisional" because of being, in a way, compromises under which the labor savings and losses resulting from increased or decreased output are divided between the employer and employee. They were suggested largely because of unsatisfactory results obtained from piece-work operation, and, though the introduction of the divisional systems

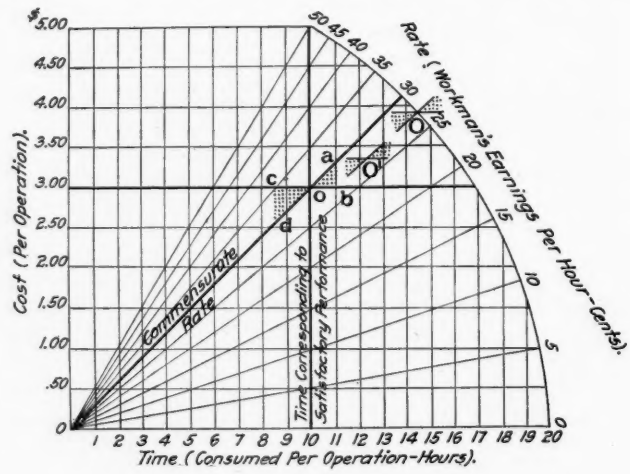


Chart 9.

did not in itself cure the difficulties with piece-work, it did immediately relieve somewhat the "thorn in the side" of the employer by returning to him a portion of the labor savings which were usually large. Their introduction has, however, almost without exception, been accompanied by better management which would have, by itself, removed some of the basic difficulties with previous day or piece-work operation.

Two triangles abc and abd are shown on Chart 8, within which the performance of all except the most unusual workman will fall; in fact, if satisfactory performance is well determined and

defined, we may safely reduce these triangles to $a' b' o c' d'$ and say that these two small triangles contain that portion of the chart within which all our operations should fall. Since the workman must be paid the commensurate rate for satisfactory performance, regardless of the system of wage payment under which he may happen to work, the wage lines of all systems must pass through the point o and lie wholly within the triangles referred to, which, as previously stated, bound the extremes of liberality and exactitude represented by the piece and day work systems. It now becomes apparent that, under uniform

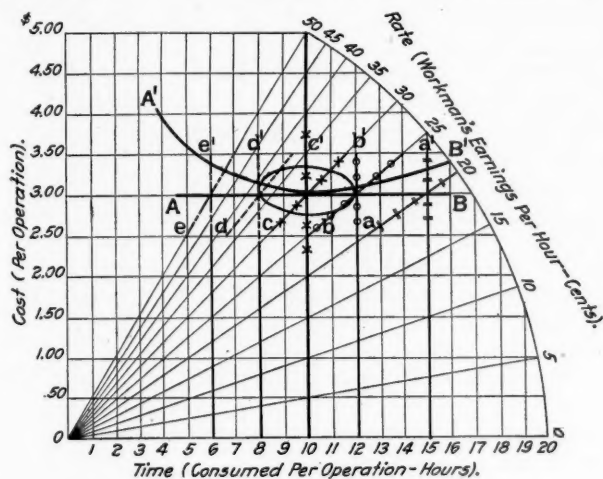


Chart 10.

degrees of management efficiency the actual differences due to variation in wage systems are relatively small and that the large variation in the efficiencies of operation under them must be due to variations in the efficiency of methods and management under which they are administered.

The greatest difficulty with operation under the piece-work and all other systems, including day work, has been inability or failure to locate the time corresponding to or actually required for satisfactory performance, the result being that operation has, instead of being within the field bounded by the

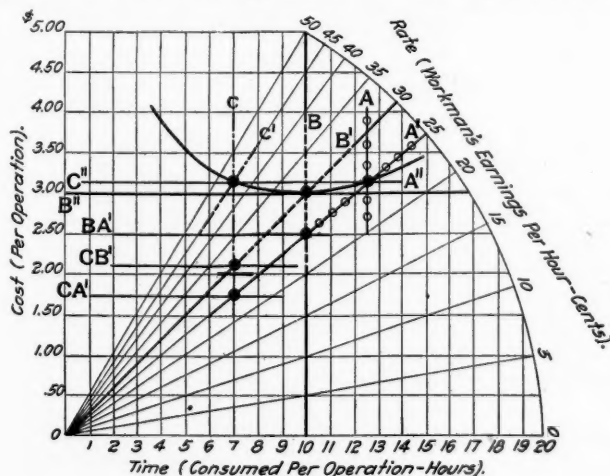


Chart 11.

triangles referred to above and connected at the common point o , been within the triangles connected at some other point such as O or O' of Chart 9, the location of which is based on a time much in excess of that actually required by satisfactory performance. Workmen do not usually co-operate in (and frequently openly oppose) the movement of the respective pairs of triangles and points corresponding to O and O' to their proper position at o , which movement is, of course, made through some such path as $a b a' b' a'' b''$, etc., of Charts 5 and 6.

The equity of operation from the standpoint of both employee and employer is therefore largely based on the proper determina-

tion of the time corresponding to satisfactory performance and of the commensurate rate. But satisfactory performance varies with the personnel of the management. Various managers or managements will require varying degrees of output. Yes, but to each definition of satisfactory performance there corresponds a certain degree of skill and energy which must be exercised for a certain amount of time, and the exercise of that degree of skill and energy will command a certain rate. Assume that such a time and rate be that represented upon Chart 10 by time and rate lines c' and c . A less time represented by d' will command a higher rate assumed as d , likewise time represented by time line e' will command a still higher rate assumed as represented by rate line e . Greater amounts of time represented by time lines b' and a' will command correspondingly lower rates, represented by rate lines b and a . According to assumptions made, the line AB , the locus of points at which time lines and corresponding rate lines intersect, is the horizontal straight cost line definitely located by intersection of any time line and its corresponding rate line.

But by considering conditions represented at the extended extremities of the line AB , we will readily see that if the line is to be the locus of points at which time lines and corresponding rate lines intersect, each extremity will be above and farther and farther removed from the straight line AB , originally considered, as we recede from the time corresponding to satisfactory

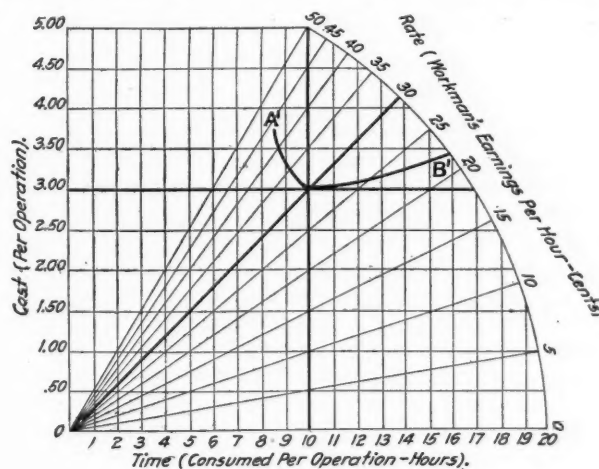


Chart 12.

performance. Considering the right extremity extended, by continuing the lowering of the rate, we will approach at a rate which does not command the exercise of a sufficient amount of skill and energy to ever satisfactorily perform the operation in question. Under such conditions the time and cost both approach infinity. On the other hand, if we continue lowering the time, we approach a time within which it is impossible to satisfactorily perform the operation. If it is possible, however, to satisfactorily perform the operation in the reduced time, an amount of skill and energy will be required, commanding a rate much higher in proportion than the resulting reduction in time.

The extremities of the locus considered are, therefore, removed an infinite distance from the time axis and the locus itself is not the straight line AB , but a convex downward curve which may be represented by $A' B'$. That portion of this curve which represents actual operating conditions lies, or should lie, within a comparatively small portion of the chart, as that shown bounded by an ellipse, and very nearly coincident with the straight line AB originally considered. We may legitimately assume then that within the field covered by actual operation and practice, a single piece-work price may be determined upon the basis of, and is equitable (that is, will pay a wage commensurate to the skill and energy actually exercised) for any of the various outputs developed by various workmen who may be engaged upon the operation.

However, it should be remembered that there is an output

(time) and a corresponding commensurate rate under which cost (equitable piece-work price) will be a minimum; and one of the problems of management is to locate as nearly as possible that time and rate resulting in minimum cost and to so balance the classes of forces used with the operations to be performed, that they may be performed at a minimum cost and at the same time satisfy workmen by reason of their having received, "a fair day's pay for a fair day's work." This means plainly that forty-five cent labor should not be used upon twenty cent work.

Under piece-work operation, the problem as actually presented, is, having given a workman with previously fixed rate (commensurate with his skill, energy, experience and other factors which may have a bearing upon his value to the service) and operating conditions, to establish a piece-work price. The employer must retain a responsibility for the methods and conditions under which the operations are performed and must require the operator (1) to perform the operation according to prescribed methods and (2) to actually exercise an amount of skill and energy commensurate with his rate, upon the basis of which together with the determined time, a piece-work price will be subsequently established.

While the complimentary times and rates actually selected as bases for the piece-work price determination must be consistent and correspond one with the other, it is not necessary that the rates and corresponding times used in establishing piece-work prices for the same operation, be the same in different shops or even in the same shop. It should be remembered, however, that there is a rate and corresponding time at which the cost will be a minimum located by the lowest point of the curve $A' B'$ of Chart 10.

Referring to Chart 11, for example, the higher time A is represented as corresponding to the lower rate A' and locating an equitable cost or piece-work price A'' . In like manner a lower time B , and a corresponding higher rate B' , locates a cost or piece-work price B'' , and a still lower time C , with the corresponding higher rate C' , locates also a cost or piece-work price C'' coincident with that located as A'' . The difference, however, between either A'' or C'' and B'' appears to be practically negligible. We have here presented in A, B and C and $A' B'$ and C' three of many complementary times and rates determining practically the same cost or piece-work price, and the question of which of these should, or can, with best advantage, be used very naturally arises.

Concretely put, a 30 cent man may perform an operation satisfactorily in ten hours, a 43 cent man should perform the operation in less time or about seven hours, while a 25 cent man will probably consume twelve hours. The cost of the operation, the equitable piece-work price, will in either case be three dollars.

The time consumed in the satisfactory performance of an operation under given conditions, ten, eight or twelve hours, can only be determined from a direct or indirect time-study; a very elastic term covering all degrees of precision and exactitude, from that involved in gathering the information upon which to base a rough estimate of the time required for a day workman to mow a lawn, to that referred to by some as of the "blood-drawing type," involved in the determination of the working schedules in some trades and shops which requires the most minute stop-watch data. Workmen object to the latter, especially until such time as all conditions of shop operation have been reduced to a degree of precision somewhere nearly consistent therewith.

In most piece-work shops there are two actually existent or implied rates, one the regular day rate, used when a workman is working under the day work system, and another a piece-work rate, which it is expected the workman will earn when working on a piece-work basis. The latter is most frequently used as the basis of establishing piece-work prices and is usually 25 per cent. to 35 per cent. higher than the former. The usual practice under which piece-work prices are established by the use of the latter high rate, necessitates a closer time-study and the use of the lower time corresponding to a performance commensurate

with the higher rate. It is thought, however, that, because the more minute and close the time-studies are made, the more objectionable they become to workmen, it is better to use the lower (day) rate and the correspondingly higher time for the basis of prices, with the understanding, that while the operations of workmen are under observation for the collection of data to be used in establishing a piece-work price, they will be expected to exercise an amount of skill and energy commensurate with the lower (day) rates which are to be combined, with the correspondingly high times determined by means of the observations made, in the formation of the piece-work price.

Special objection should be expected when for one reason or another the degree of skill and energy required by the pace set under the time-study exceeds that for which rates (those upon which piece-work prices are based) are commensurate; in other words, by reference to Chart 11 again, the combination of time B and rate A' will result in a piece-work price $B A'$, \$2.50, much lower than either A'' , C'' or B'' ; likewise the combination of time C and rate B' or A' will result in a piece-work price $C B'$, \$2.10, or $C A'$, \$1.75, both of which are much lower than the practically identical piece-work prices A'' , C'' or B'' , originally referred to. The results of any attempt to get \$3.00 worth of work done for \$2.50, \$2.10 or \$1.75 should be apparent.

We have attempted to show that:

(1) The satisfactory operation of piece-work or any reward system of labor payment is most largely dependent upon careful consideration and equitable selection of the co-ordinate basic elements, time and rate.

(2) The selected times and rates must mutually correspond.

(3) After such selection the differences in the various reward systems are of minor importance.

(4) Small differences actually existing are most favorable to the desirable employee and least favorable to the slower undesirable employee under the piece-work system.

Day-work, the original system of labor payment, must continue to be used for by far the largest percentage of work done, and the application of reward systems must be restricted to such operations as permit of convenient and accurate measurement of output, which is more or less largely under the control of the workmen.

The non-use of a reward system of payment does not obviate the necessity of giving the time element of wage payment attention; in fact, although not used directly in the determination of wages, some shops, among them a few operated by railroads, keep accurate records of output based upon time elements determined for those operations to which reward wage payment might be applied, which are very instrumental in the maintenance of high shop labor efficiency. It is unquestionably more difficult to maintain shop efficiency under exclusively day-work, without the co-operation of workmen occasioned by reward payment, but it is being done, and with excellent results, with the assistance of individual output records.

We desire, however, to call attention to the fact that the amount of skill and energy which may be profitably exercised upon a given operation is limited and that surplus skill and energy, especially the former, will result in a corresponding increase in output. In other words, instead of assuming the very gradually rising slope shown by the Charts 10 and 11, for the left hand portion of the loci of the intersection of corresponding times and rates, the curve will rise very abruptly from the point of intersecting time and rate corresponding to and commensurate with the maximum amount of skill and energy which can be profitably exercised upon, or is required by operation. The employment of higher skilled labor upon the operation will very rapidly increase the cost, with very slight increase in output as shown by Chart 12. The curve $A' B'$ is that of an operation the satisfactory performance of which requires a degree of skill and energy commanding a rate of about 30 cents an hour, at which rate the cost will be approximately \$3.00 per operation. A higher rated workman, say one of 50 cents per hour instead of 30 cents, upon the same work will require a higher

piece-work price, say of approximately \$5.00 instead of \$3.00, because his additional skill cannot be profitably employed upon the operation in question. So it is that piece-work prices established are usually those which will pay to the highest rated workman who may be profitably employed upon the operations covered, a wage consistent with their skill and experience. The result is that the higher-priced workmen, employed upon lower-classed work, must receive higher piece-work prices to enable them to make wages commensurate with their skill and at the same time will be over-paid from the standpoint of the labor cost of the work they turn out.

The dissatisfaction, or at least, the confusion which frequently results, under the piece-work system, from workmen of varying skill and experience upon the same operations for the same piece-work rate, therefore, suggests many advantages in a separation of the time and rate elements, or rather, the discontinuation of their combination in piece-work price, and the quotation of the time element only (invariable as between men) instead of the piece-work price, one element of which is the rate which should measure the workman's value (his skill, length of service, etc.). The rate element (workman's rate) should remain fixed for any workman regardless of work upon which he may be engaged and should be paid him for a fixed amount of time for each satisfactorily completed operation. It is believed that such separation will eventually become generally adopted (though probably not for a number of years).

Summarizing we have attempted to show that:

- (1) Time is the all-important element under any and all systems of labor payment.
- (2) With proper attention to the time element and otherwise efficient administration, the differences between the various systems of wage payment are of minor importance.
- (3) Piece-work, with its advantages over other reward systems, in simplicity, minimum accounting, etc., should be used where a reward system of payment is applicable.
- (4) Adjustments of methods, as are necessary to get a purely time basis by quotation of time elements instead of piece-work process, should be considered and furthered as opportunity offers.

CHICAGO & NORTH WESTERN DEMONSTRATES SMOKE ABATEMENT DEVICE.

The Chicago & North Western made a demonstration run Tuesday, April 15, for the benefit of various railway officials and press representatives, from Chicago to Proviso, testing out a device for smoke abatement on locomotives, recommended to the railways about Chicago by the General Managers' Association. Some months ago O. Monnett, smoke inspector for the city of Chicago, called the attention of the General Managers' Association to the fact that there were wide differences of opinion among the railroads as to the most efficient locomotive smoke preventing device—each road maintaining that the devices used by it were the best.

The General Managers' Association accordingly appointed a special committee consisting of representatives of the mechanical departments of the Pennsylvania, Chicago & North Western, Chicago, Burlington & Quincy, Chicago, Milwaukee & St. Paul, and the Chicago & Western Indiana Railways, which committee was asked to make comparative and efficiency tests of the several smoke preventing devices. Extensive tests were made on the Pennsylvania Railroad's testing plant at Altoona, the results of which will be presented before the Master Mechanics' Association at its June convention. In brief, it was found that either the double or multiple tip blower nozzles should be used; that the grate should have not less than 30 per cent. air opening; that sufficient air tubes should be provided above the fire, so that a total of 2,000 cu. ft. of air per minute could be supplied by means of steam jets, the nozzles of which shall be located 8½ in. from the inside ends of the tubes; that the brick

arch prevents more smoke while the locomotive is running than when standing, and that such an arch gives the best results when fitted tight up against the flue sheet; that there is advantage in a large quick-opening blower valve.

The test run was made with an 18 in. x 24 in. superheater 6-wheel switch engine equipped in accordance with the above recommendations. The trip out to Proviso was made with a train of about 1,000 tons gross, and the results obtained were considered very satisfactory by all observers, there being practically no smoke thrown from the stack throughout the whole trip. On reaching Proviso some severe tests were made on the device. It was cut out of service and the engine was allowed to smoke as badly as possible, then when being put into service again it was found that the smoke could be eliminated in from five to seven seconds. On the return trip a trainload of over 1,200 tons was hauled, a part of the distance being up a grade of 32 ft. per mile, no objectionable smoke being emitted from the engine at any time. The smoke density to Proviso was 4.6 per cent., and from Proviso 4.3 per cent.

In addition to the above mentioned test committee the General Managers' Association appointed a standing committee consisting of M. K. Barnum (chairman), Illinois Central; H. T. Bentley, Chicago & North Western, and E. F. Jones, of the "Belt" Railway. This committee developed the plan for the "Railroad Smoke Inspectors' Association of Chicago," which was organized on January 2, 1913, for the purpose of bringing about the thorough interchange of thoughts and ideas between the smoke inspectors employed by the various Chicago railroads, and to utilize the inspectors for the joint benefit of all lines by requiring them to report cases of emissions of dense smoke, whether made by locomotives of their own company or by those of any other railway coming under their notice, thus bringing about increased efficiency in this line of work.

This association holds a meeting every alternate Friday, and the co-operation secured in this manner has done much in the way of reducing smoke on the part of the railroads in this district. The number of smoke inspectors on Chicago railroads has been increased from 32 to 41, making the number of locomotives in daily operation in Chicago per inspector employed, 40 as against formerly 52. The chairman of this association is J. H. Lewis, Chief Smoke Inspector of the Chicago, Burlington & Quincy, and the chairman of the Executive Committee is C. W. Corning, Chief Smoke Inspector of the C. & N. W. Ry., with C. P. Burnalle, Chief Smoke Inspector of the A. T. & S. F., as the secretary.

The railroad smoke conditions in Chicago today as compared to the smoke densities in other cities and towns where no smoke ordinance is in effect is as follows:

Nashville, Tenn.	30 per cent.
East St. Louis	40 per cent.
Peoria	30 per cent.
LaSalle	30 per cent.
Down Town Chicago.....	6 per cent.

In 1910 the smoke density of down town Chicago was 23 per cent., which figure represents the density for South Chicago today. Intermediate sections of the city show a density of 12 per cent., showing that the effort of supervision in the down town section has had the effect of reducing the smoke density to a point which was thought absolutely impossible two or three years ago.

ALGECIRAS RAILWAY, SPAIN.—It is said that this line will shortly be taken over by the Andalusian Railways, on terms of purchase which it is believed are very favorable to the former. The line runs from Algeciras, the Spanish port for Gibraltar, to Bobadilla, the junction for Malaga, Granada Seville and Cordoba, and its acquisition by the Andalusian Company will give the latter practically a monopoly of traffic in the southeastern corner of Spain, as well as the exclusive entry into the three important ports of Cadiz, Algeciras and Malaga.

THE INADEQUACY OF RAILWAY MAIL PAY.

Facts Presented Before Congressional Committee by W. A. Worthington Showing Unfairness of Compensation to Railways.

The accompanying charts illustrating graphically the tendency of railway mail pay in comparison with the other expenditures and receipts of the post office department, and with the receipts from other classes of traffic and the operating expenses of the railways during recent years were presented by W. A. Worthington, vice-president of the Southern Pacific, at a hearing in Washington on March 27, before the Joint Congressional Committee on Postage on Second Class Mail Matter and Compensation for the Transportation of Mails. The charts were submitted incidentally to a presentation of facts regarding railway mail pay which Mr. Worthington made on behalf of the Southern Pacific Company.

Fig. 1 shows the percentage of total postal receipts which the railroads of the United States have received for each year from 1900 to 1911, inclusive, and the percentage of the total

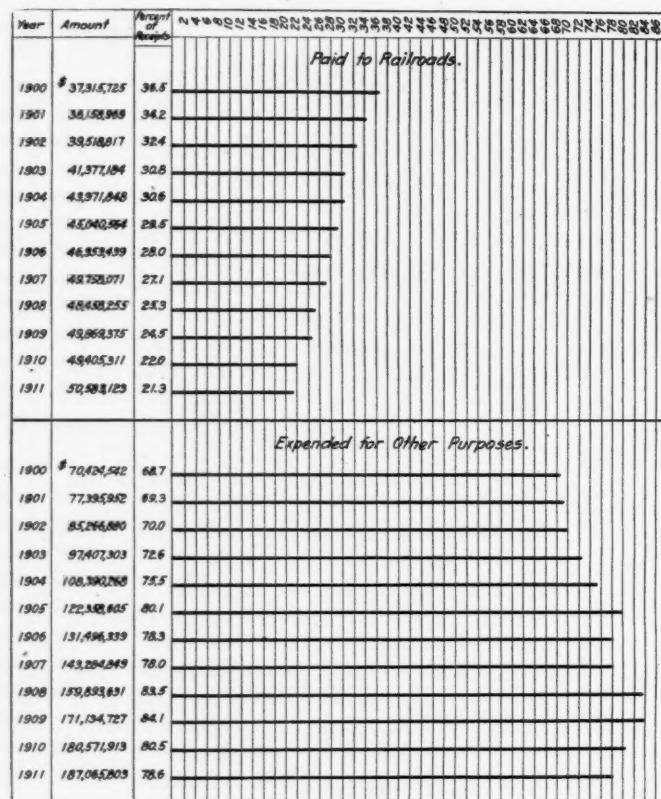


Fig. 1—Percentage of Total Postal Receipts Paid to the Railroads and Expended for Other Purposes.

postal receipts which have been expended for other purposes, as shown by post office department annual reports. In looking over the operations of the post office department it will be observed that in the ten years from 1901 to 1911, the receipts have more than doubled, and the following statement shows what a small percentage of this large increase in receipts went to the railroads:

	1911.	1901.	Increase, 1911 over 1901.	Per Cent.
Postal receipts	\$237,879,823	\$111,631,193	\$126,248,630	113
Postal expenditures:				
To railroads	\$50,583,123	\$38,158,969	\$12,424,154	33
Other purposes	187,065,803	77,395,952	109,669,851	142
Total	\$237,648,926	\$115,554,921	\$122,094,005	106
Surplus	\$230,897			
Deficit		\$3,923,728		

The figures show that out of the total postal receipts of \$112,000,000 in 1901, \$38,000,000, or 34 per cent., went to the railroads, while out of the \$126,000,000 increase in 1911 over 1901 only \$12,000,000, or less than 10 per cent., was paid to the

railroads. As the volume of service rendered by the railroads in hauling tonnage increased very much in proportion to the receipts, they received only about one-third as much for the added traffic since 1901, as they received on the total traffic of

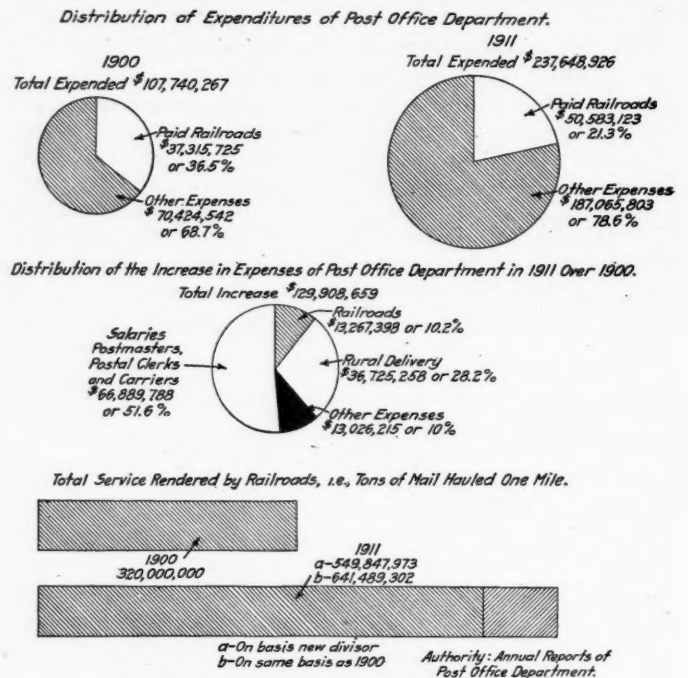


Fig. 2—Post Office Department Statistics.

ten years ago. This saving to the government, however, was more than offset by the increased expenditures of the post office department for other purposes, which, while only \$77,000,000 in 1901, were \$187,000,000 in 1911. In other words, of the total postal receipts of 1901, 69 per cent. was expended for purposes other than railroad compensation, while of the increase since

Item	Year	Amount	Rate	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230
Total Receipts of Post Office Department	1900	\$102,354,579	100																							
	1907	183,585,005	179																							
	1911	237,879,823	232																							
Total Revenues of Railroads from all Traffic	1900	\$185,044,814	100																							
	1907	2,598,105,578	174																							
	1911	2,793,761,669	189																							
Total Railway Operating Expenses	1900	\$861,428,511	100																							
	1907	1,748,515,814	182																							
	1911	1,915,094,005	199																							
Railway Mail Pay	1900	\$37,315,725	100																							
	1907	49,758,071	133																							
	1911	50,583,123	136																							
Percent Mail Pay to Post Office Department Receipts	1900	36.5	100																							
	1907	27.1	74																							
	1911	21.3	58																							
Taxes Paid by Railroads	1900	\$48,332,273	100																							
	1907	80,312,373	166																							
	1911	108,308,572	226																							
Mail Revenue	1900	\$96	100																							
	1907	93	97																							
	1911	83	86																							
Express Revenue	1900	\$72	100																							
	1907	105	146																							
	1911	116	161																							
Passenger Revenue	1900	\$823	100																							
	1907	1,036	126																							
	1911	1,076	131																							
Freight Revenue	1900	\$2,000	100																							
	1907	2,740	137																							
	1911	2,893	145																							
Operating Expenses Per 1000 Average Train Miles	1900	\$1,073	100																							
	1907	1,470	137																							
	1911	1,523	144																							

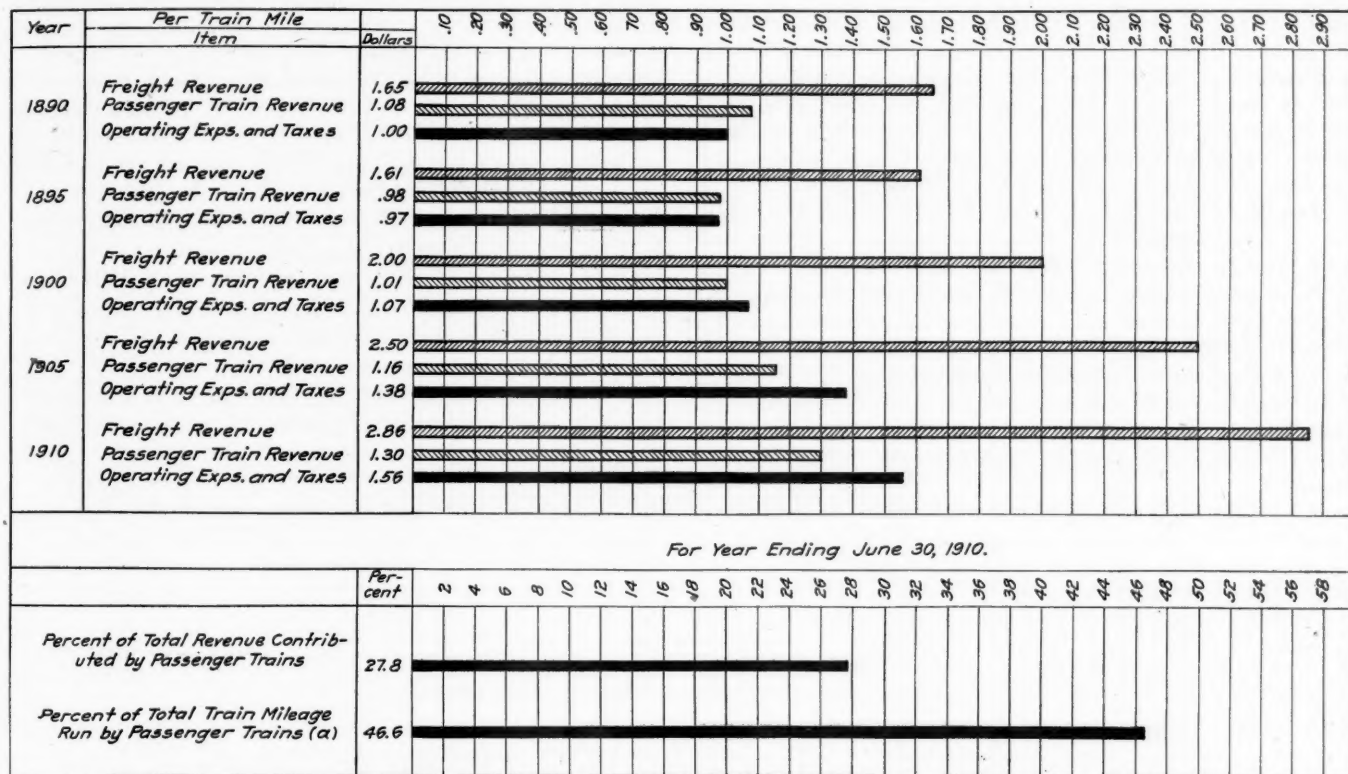
Fig. 3—Statistics of Railway Mail Service and Other Classes of Traffic Covering All Railroads.

1901, amounting to \$126,000,000, 87 per cent. was expended for other than railroad transportation.

Fig. 2 shows a distribution of expenditures of the post office department for the years 1900 and 1911 as between railroad and

other expenditures; the relative service rendered by the railroads in these two years was doubled for an increase of only a little more than one-third in compensation.

Fig. 3 illustrates graphically for the years 1900, 1907 and



Note: (a) Mixed Trains counted both as passenger and freight.
Authority: I.C.C. Statistics of Railways of United States.

Fig. 4—Trend of Revenue from Passenger and Freight Trains and Operating Cost per Train Mile for All Railroads, Covering a Period of Twenty Years.

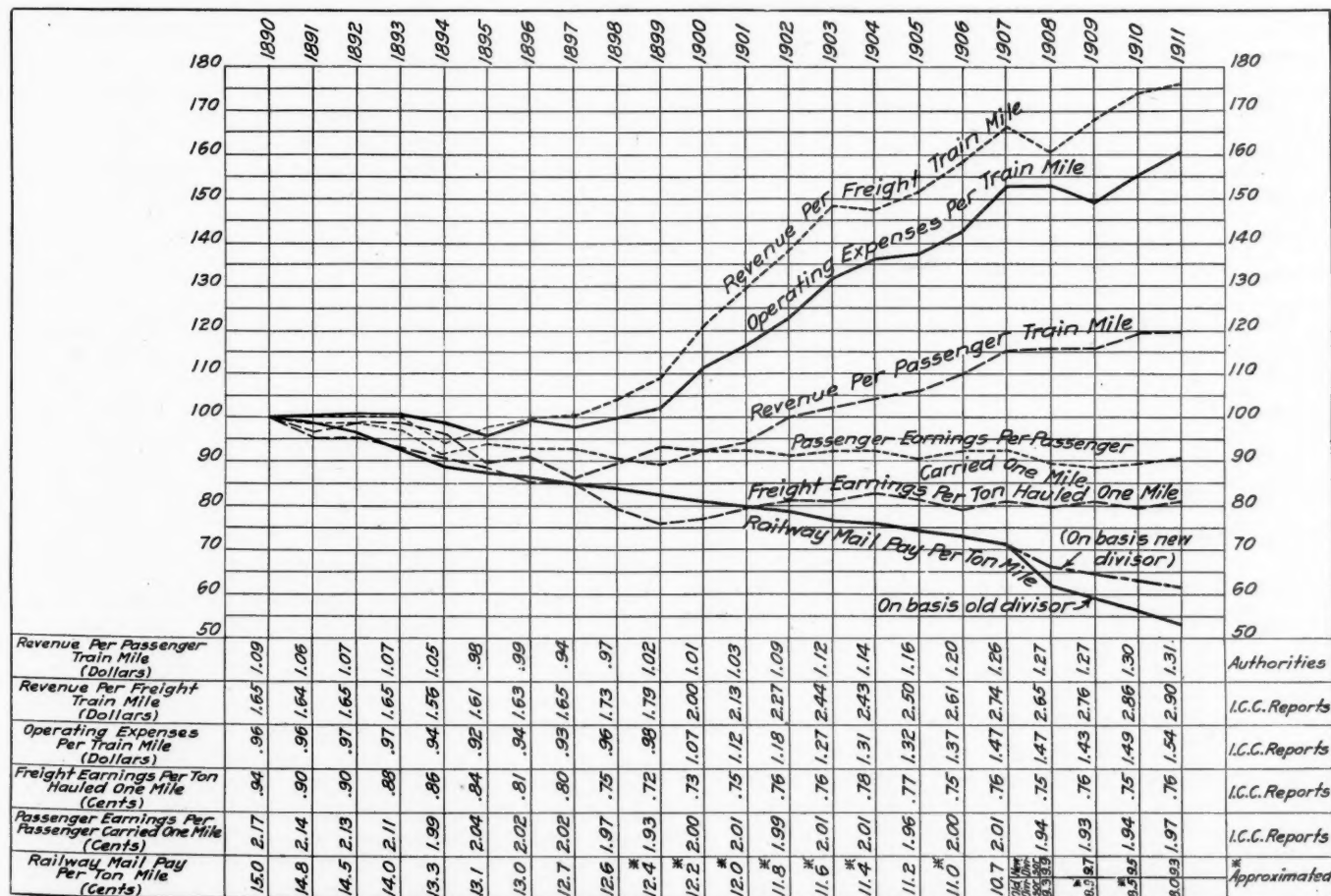


Fig. 5—Relative Revenue per Unit of Traffic from Mails, Passengers and Freight for All Railroads; Year 1890 taken as 100.

1911 the great increase in receipts of the post office department as compared with the increase in total railroad revenue, in total operating expenses, and in taxes paid by the railroads, and as compared with the relatively small increase in the railways' compensation for carrying the mail. It also shows per 1,000 passenger train miles run on the railways of the United States that from 1900 to 1911 there was a decrease of 14 per cent. in mail revenue, compared with an increase of 31 per cent. in revenue from passengers, 45 per cent. in revenue from freight, and 61 per cent. in revenue from express. During the same time railway operating expenses per 1,000 train miles increased 44 per cent.

This figure strikingly illustrates the slight extent to which the railways have shared in the available greater revenue of the post office department and the actual decrease in payments for carrying mail in proportion to the volume of passenger train service. As is well known, railway wages are very much higher than formerly, prices of material have advanced, the cost of building steel mail cars and operating them is much greater than formerly, yet railway mail pay per unit of traffic has been very greatly reduced during the past 10 or 15 years in the face of changes in industrial conditions that should have increased it.

Fig. 4 illustrates changes that have taken place in railway freight revenue, passenger train revenue, and railway operating expenses and taxes per train mile in 1895, 1900, 1905 and 1910 as compared with 1890. The statistics show there is little for the railways in passenger train service as a whole, and least

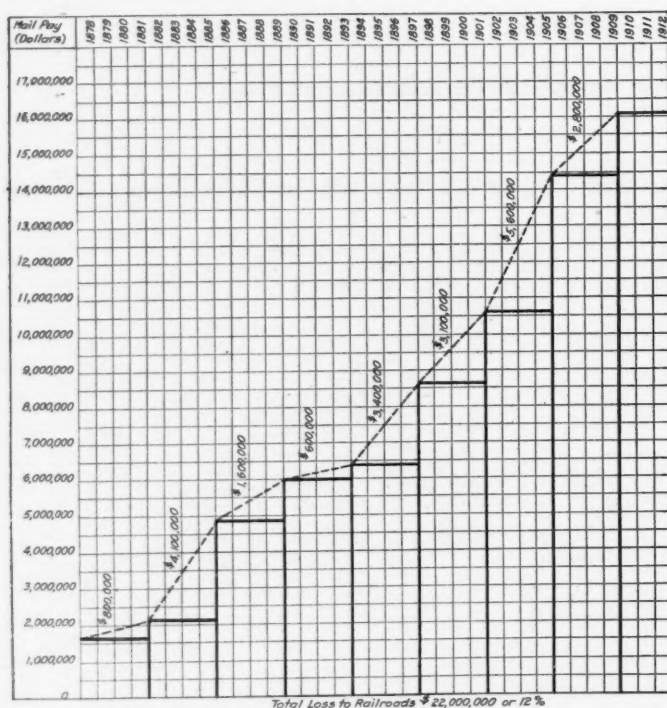


Fig. 6—Diagram Showing Loss in Mail Revenue to Railroads by Weighing Mail Quadrennially Instead of Annually in I. C. C. Groups 7, 8, 9 and 10.*

of all in the handling of the mail. This chart also shows that for the year ending June 30, 1910, although 46.6 per cent. of the total train mileage was run for passenger train service, only 27.8 per cent. of the revenue was contributed by the service rendered by passenger trains.

Fig. 5 shows for the railroads of the United States the relative revenues per unit of traffic from mails, passengers and freight during the past 21 years, the year 1890 being taken as unity or 100. The great increase that has taken place in the last 15 years in railway operating expenses as compared with the

*Group 7 includes Montana, Wyoming, North and South Dakota and Nebraska. Group 8 includes Colorado, Kansas, Missouri, Arkansas and Oklahoma. Group 9 includes Louisiana, Texas and Mexico. Group 10 includes Oregon, Washington, Idaho, Utah, Nevada, Arizona and California.

pay received for carrying the mails is graphically illustrated. The cost of operating railways per train mile during this period increased over 60 per cent., the railway revenue per passenger train mile increased 20 per cent., the passenger earnings per passenger carried one mile decreased slightly, and the railway mail pay per ton mile of mail was nearly cut in two, using the same divisor throughout the period. The ton mileage rate for mails was obtainable up to and including 1898 from a statement of Prof. Henry C. Adams in 1899 before the commission to investigate the postal service. In order to secure later figures, ton mileage on all the mail routes was compiled for 1905, 1907, 1908 and 1911, figures for other years being approximated, as the decline in railway mail pay under the automatic operation of the law is fairly uniform.

Fig. 6 illustrates graphically the fairness of the railways' re-

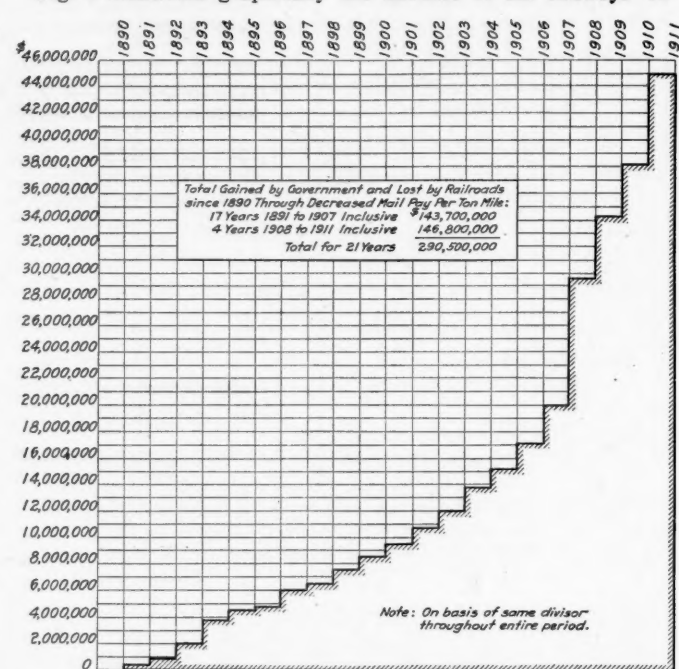


Fig. 7—Annual Gain to Government and Loss to the Railroads Since 1890 Through Decreased Mail Pay per Ton Mile Through Automatic Operation of the Law and Because of Other Reductions by Government Authority Commencing in 1907.

quest for annual instead of quadrennial weighing. It shows for the western states the results of weighing from 1878 to date, the heavy line indicating the actual payments and the dotted line the amounts to which the railways believe they were fairly entitled, the triangles formed between the heavy lines and dotted line representing the losses to the railroads through annual weighing, these losses being expressed in figures on the chart. The growth in the western group of states was no doubt greater in proportion than in the rest of the country, but the chart is presented to illustrate the service rendered by the railroads for which they contend they received no compensation whatever.

Fig. 7 illustrates graphically the gain to the government and loss to the railroads by years since 1890 through decreased mail pay per ton mile on account of the natural or automatic operation of the law and because of other reductions made by governmental authority since the beginning of 1907. This chart shows that the amount of these reductions for the 17 years from 1891 to 1907, inclusive, was \$143,700,000, while for the four years from 1908 to 1911, inclusive, it was \$146,800,000, or a total for the 21 years of \$290,500,000. These figures are obtained by applying the average rate per ton mile effective in 1890 to the traffic handled in subsequent years, the difference between the amount so obtained and the actual compensation representing the amount saved to the government and lost to the railroads through reduction in rates per ton mile. It also demonstrates

that the government was sharing quite generously in reduced rates through the automatic operation of the statute without making the additional reductions by governmental authority commencing in 1907, when it is considered that through most of this period the railroads were contending with higher operating cost per traffic unit due to causes beyond their control. It further demonstrates that the present law has been a most favorable one to the government, having secured greater reductions for carrying mail than have been made for any other class of railway traffic.

FIREMEN'S ARBITRATION AWARD.

The award of the arbitrators between the eastern railroads and the Brotherhood of Locomotive Firemen and Enginemen was filed April 23, 1913, and in accordance with the provisions of the Erdman act will take effect ten days later. The first part of the report follows in part, but the award is given in full.

THE ARBITRATOR'S REPORT.

Some time about the middle of 1912, the Brotherhood of Locomotive Firemen and Enginemen, through its duly accredited officers, in support of the demands of the firemen and hostlers presented a request on behalf of all of such employees for an increase in wages, and for sundry improvements of the rules controlling their conditions of service. As early as July 1, a meeting was held between the committee representing the firemen and the conference committee of managers of the railroads in New York, and subsequent to that date a number of other similar meetings were held, and much correspondence engaged in. The firemen were represented in these conferences by W. S. Carter, president, and other officers of the brotherhood, and the railroads were represented by Elisha Lee, chairman of the conference committee of managers, and other gentlemen associated with him on the committee.

After numerous conferences and the exchange of proposals, the parties to the controversy were unable to agree and jointly asked Martin A. Knapp, presiding judge of the United States Commerce Court, and Charles P. Neill, commissioner of labor, to mediate the differences between the firemen and the railroads in pursuance of the provisions of the Erdman act, but they were unable to compose the differences, and the entire correspondence covering the negotiations between the brotherhood and the railroads, together with a historical statement thereof, was published over the signatures of the officers of the brotherhood and the question of a strike was submitted to the firemen employed through the territory covered by the railroads party to the controversy; a strike vote was taken, the total number of votes cast in the strike vote being 33,916, of which 32,918, or 96.5 per cent., were cast for the strike. This created a situation full of serious possibilities, not only to the parties immediately concerned, but in a much wider sense to the general public, and which seemed to be equally appreciated by the representatives of the brotherhood and the railroads.

Immediately following the counting of the strike vote further conferences were held between the conference committee of managers and the brotherhood representatives, but as they were still unable to agree upon a settlement, the president of the Brotherhood of Locomotive Firemen and Enginemen invoked the assistance of Martin A. Knapp, presiding judge of the United States Commerce Court, and G. W. W. Hanger, acting commissioner of labor, to mediate the differences between the firemen and the railroads, in pursuance of the provisions of an Act of Congress concerning carriers engaged in interstate commerce and their employees (commonly known as the Erdman act, approved June 1, 1898). Messrs. Knapp and Hanger promptly responded to this request for mediation. Their efforts at mediation did not accomplish a settlement of the controversies, but resulted in an agreement between the parties to adjust their differences by arbitration, under the provisions of the Erdman act.

The railroads appointed as their arbitrator William W. Atterbury, of the Pennsylvania Railroad, and the brotherhood ap-

pointed as its arbitrator, Albert Phillips, of Sacramento, Cal. The two arbitrators thus chosen, having failed within five days after their first meeting for that purpose, requested the presiding judge of the United States Commerce Court and the acting commissioner of labor to appoint a third arbitrator. William L. Chambers, of Washington, D. C., was appointed as such third arbitrator on March 3.

The board of arbitrators appointed as above, held its first meeting at the Waldorf-Astoria hotel, New York, on Monday, March 10, 1913. William L. Chambers was elected chairman and H. S. Milstead was appointed temporary secretary and subsequently his appointment was made permanent. Sessions of public hearings were held daily, with the exception of Sundays, from March 10 to and including the fifth day of April, 1913.

The first session of the board was occupied by a statement of the chairman of the board, followed by an opening statement on behalf of the brotherhood by W. S. Carter, its president, this being followed by the statement of Elisha Lee on behalf of the railroads. Employees from many different lines of railroads throughout the territory covered by them were called on behalf of the firemen, and in connection with their testimony given on the stand, some fifty odd printed exhibits were presented by Mr. Carter.

The railroads called perhaps an equal number of witnesses and filed a large number of exhibits. It is probable that no such elaborate or valuable statistical matter was ever submitted in a similar arbitration before. At the conclusion of the public hearings and after oral arguments covering several days, printed briefs were filed by the respective parties, which have been of great assistance to the board in reaching its conclusion.

The railroads involved in this concerted arbitration comprise practically all that part of the United States east of the Mississippi and north of the Ohio and Potomac rivers. The trackage of these railroads is approximately 70,000 miles of main line, being something more than one-fourth of the entire trackage of the United States. These railroads represent practically forty per cent. of the total capitalization for all railroads in the United States; they carried about forty-seven per cent. of the ton miles and about forty-three per cent. of the passenger miles of all railroads of the United States.

The firemen employed on these railroads number in the neighborhood of 31,000 for the year 1912, and the wages for the year 1912 was approximately \$29,000,000. These figures indicate, with some degree of certainty and emphasis, the magnitude of the problem and the far-reaching character of the controversies submitted for the arbitrament of this board. Reference must be had to the three printed and bound volumes of evidence taken on the stand, comprising more than two thousand pages, the four volumes of printed exhibits, comprising perhaps as many more pages in the aggregate, and the exhaustive briefs of counsel, in order to form a due estimate of the comprehensive and difficult task undertaken, the conclusions of which by the board are now stated.

The award made by the board is as follows:

THE AWARD.

Article 1: Ten hours or less, or one hundred miles or less, shall constitute a day's work in all classes of service, except as otherwise specified. The time for which firemen will be paid shall begin at the time he is required to report for duty, and end when the engine is delivered at the point designated.

Article 2: The following rates of wages per day shall be the minimum rates paid in all classes of service on all railroads, parties to this arbitration:

(a) PASSENGER SERVICE.

Weights of Locomotives in pounds on Drivers.	
Less than 80,000 lbs.	\$2.45
80,000 to 100,000 lbs.	2.50
100,000 to 140,000 lbs.	2.60
140,000 to 170,000 lbs.	2.70
170,000 to 200,000 lbs.	2.85
200,000 to 250,000 lbs.	3.00
250,000 to 300,000 lbs.	3.20
300,000 to 350,000 lbs.	3.40
All engines over 350,000 lbs. on drivers.	3.60
Mallet engines regardless of weight on drivers.	4.00

FREIGHT SERVICE.

Less than 80,000 lbs.	\$2.75
80,000 to 100,000 lbs.	2.85
100,000 to 140,000 lbs.	3.00
140,000 to 170,000 lbs.	3.10
170,000 to 200,000 lbs.	3.20
200,000 to 250,000 lbs.	3.30
250,000 to 300,000 lbs.	3.55
All engines over 300,000 lbs. on drivers.	4.00
Mallet engines regardless of weight on drivers.	4.00

Where two firemen are employed on a locomotive as a result of the application of Article 6 hereinafter, the rates of pay to each fireman shall be as follows:

Weight on drivers, 100,000 up to 250,000 lbs.	\$2.75
Weight on drivers, over 250,000 lbs.	3.00

(b) SWITCHING SERVICE.

Switch engine firemen on locomotives weighing less than 140,000 lbs. on drivers, per day of ten hours or less.	\$2.50
Switch engine firemen on engines weighing 140,000 lbs. or over on drivers, per day of ten hours or less (excluding Mallets \$4.00)	2.60

(c) HOSTLERS.

Hostlers, per day of ten hours or less.	\$2.40
If hostlers are employed in handling engines between passenger stations and roundhouses or yards, or on main tracks, they will be paid, per day of ten hours or less.	3.25
If men are employed to assist hostlers in handling engines between passenger stations and roundhouses or yards, or on main tracks, they will be paid, per day of ten hours or less.	2.50

(d) HELPER ON ELECTRIC LOCOMOTIVE.

The term "helper" will be understood to mean the second man employed on electric locomotives, and he shall receive in passenger service, per day of ten hours, or less, one hundred miles or less.	\$2.50
In through freight per day of ten hours or less, one hundred miles or less.	2.80
In switching service, per day of ten hours or less.	2.50

All working conditions applicable to steam locomotive firemen in steam service will apply to helpers in electric service.

(e) Firemen on locomotives in pusher and helper service, mine runs, work, wreck, belt line and transfer service, and all other unclassified service will be paid through freight rates according to the class of engine.

(f) Firemen in local freight service will be paid fifteen cents in addition to through freight rates according to class of engine.

(g) For the purpose of officially classifying the locomotive, each railroad, party to this arbitration, will keep bulletins posted at all terminals showing accurately the weight on drivers of all engines in its service.

Article 3: (a) Overtime in all classes of service, except passenger, will be paid for pro rata on the minute basis. Except as otherwise specified ten hours, or one hundred miles will be the basis for computing overtime. Miles and hours will not be counted together; when miles exceed hours, miles will be allowed, and when hours exceed miles, hours will be allowed.

(b) Overtime in passenger service (except suburban service) will be paid at the rate of thirty cents per hour on the basis of twenty miles an hour, computed on the minute basis. Five hours or less, one hundred miles or less, to constitute a day's work.

(c) On short turn around runs, no single one of which exceeds eighty miles, including suburban service, overtime shall be paid for all time actually on duty, or held for duty, in excess of eight hours (computed on each run from the time required to report for duty to end of that run) within twelve consecutive hours; and also for all time in excess of twelve consecutive hours, computed continuously from the time first required to report to the final release at the end of the last run. Time shall be counted as continuous service in all cases where the interval of release from duty at any point does not exceed one hour.

Article 4: No initial terminal delay is allowed beyond that involved in the rule that pay shall begin in all cases at the time fireman is required to report for duty, but final terminal delay after the lapse of one hour will be paid for at the end of the trip, at the overtime rate, according to the class of engine, on the minute basis. For freight service final terminal delay shall be computed from the time the engine reaches the designated main track switch connecting with the yard track. For passenger service final terminal delay shall be computed from the time the train reaches the terminal station. If road overtime has commenced terminal overtime shall not apply, and road overtime shall be computed to the point of final release.

Article 5: Firemen in pool freight and in unassigned service held at other than home terminal, will be paid continuous time for all time so held after the expiration of eighteen hours from time relieved from previous duty, at the rate per hour paid him for the last service performed. If held fourteen hours after the expiration of the first twenty-eight hour period, he will be paid continuous time for the next succeeding ten hours, or until the end of the twenty-four hour period, and similarly for each twenty-four hour period thereafter. Should a fireman be called for duty after pay begins, his time will be computed continuously.

Article 6: When a second fireman is deemed necessary on any engine or assistance is deemed necessary on any engine where one fireman is employed, the matter will be taken up with the proper officials by the Firemen's Committee. Failing to reach a settlement the matter shall be referred to an Adjustment Commission, to be composed of five persons, two of whom are to be chosen by the railroad, two by the Firemen's Committee, and one to be selected by the four thus chosen, who shall be the chairman of the commission. Should the four men fail to agree upon the fifth, then three days after the last of the four is selected, the fifth man shall be named by the presiding judge of the United States Commerce Court. If, for any reason, the selection of the fifth man cannot be made by the presiding judge of said court, he shall be named by the United States district judge of the district in which the controversy may have arisen. All expenses incurred in connection with the settlement of such matters shall be borne equally by the two parties to the controversy.

Article 7: Firemen will be relieved of cleaning engines. Lubricators will be filled, headlights, markers and other lamps cared for (including filling but not lighting), and all supplies placed on engines at points where roundhouse or shop force are maintained. The firemen shall not be relieved of responsibility of knowing that engines for which they are called are properly equipped for service.

Article 8: Firemen tied up between terminals on account of the hours of service law, will be paid continuous time from initial point to tie-up point. When they resume duty on a continuous trip they will be paid from tie-up point to terminal on the following basis: For fifty miles or less, or five hours or less, fifty miles pay; for more than fifty miles up to one hundred miles, or over five hours, and up to ten hours, one hundred miles pay; over one hundred miles, or over ten hours, at schedule rates. This provision does not permit the running of firemen through terminal or around other firemen at terminals, unless such practice is permitted under the pay schedule.

Article 9: The earnings of firemen in any class of service shall not be diminished by the provisions of this award; and if the rates that were higher or the conditions that were better antecedent to this award are necessary to guarantee this requirement they shall be maintained. Neither shall the earnings of the firemen, in any class of service, be increased above what the higher rates of pay and the conditions that were better antecedent hereto guaranteed him, by a combination of the rates herein established with the conditions of service antecedent hereto, or vice versa.

It is not intended that any of the terms or provisions of this award shall debar committees from taking up for adjustment with the management of the respective railroads any questions or matters not specifically covered herein.

Article 10: This award shall take effect at the time and in the manner provided by the act of congress entitled "An Act Concerning Carriers Engaged in Interstate Commerce and Their Employees, Approved June 1, 1898." All parties to this arbitration having stipulated in writing, and incorporated in the record an agreement, extending the time within which the award may be made and filed, from the second day of April, 1913, to and including the twenty-third day of April, 1913, the arbitrators now, on this twenty-third day of April, 1913, signed this award without dissent in any particular to any of its provisions by any one of them, and have required the secretary to attest the same.

General News.

At a "Safety rally" of employees of the Buffalo, Rochester & Pittsburgh at DuBois, Pa., on the 12th, three thousand persons were present.

A controversy between the International & Great Northern and its firemen has been settled by an agreement on new working conditions and slight advances in pay, affecting about 300 men.

Twelve experienced dining car conductors have been brought from England to work on the Canadian Pacific. One of the twelve was for eight years in the service of the Central South Africa Railway.

The Brotherhood of Railroad Trainmen has presented to the railroad commission of Louisiana a petition asking that changes be made in the rules issued by the commission relating to the duties of flagmen.

A jury in the federal court at Minneapolis has awarded H. W. Otis, of Willmar, Minn., a judgment of \$50,000 against the Great Northern Railway on account of the loss of a leg while coupling cars equipped with an old style coupling where there should have been an automatic coupler.

The new federal law prescribing severe punishment for stealing from freight cars engaged in interstate commerce has been made the subject of a placard, which has been issued by the general manager of the Pennsylvania Railroad and posted in all stations of the road.

The Missouri Pacific and the Denver & Rio Grande have reduced the running time of passenger trains between Denver and St. Louis by about three hours. The new passenger train put in service on April 20, leaves Denver at 11:55 a. m. and arrives in St. Louis at 7:25 p. m. the next day.

At a recent meeting of representatives of various commercial clubs in Kansas and Colorado a committee was appointed to ask the Atchison, Topeka & Santa Fe to electrify its lines west of Dodge City, Kan., using power developed from the Arkansas river, and to sell a part of the current to farmers for use in irrigation.

The latest achievements of the aviators have included a flight of 250 miles into the Sahara Desert by four aeroplanes of the French army, and a tour by two men, in a single machine, which covered parts of England, France, Belgium and Holland, the whole trip taking only four hours and seven minutes. The distance traveled was 245 miles, and the crossing of the English Channel is treated as merely an incident of the flight.

William H. Schroeder, the engineman who was at fault in the collision at Corning, N. Y., last July, and who was not prosecuted, has been reindicted, apparently in consequence of the charge made by President Truesdale, of the road, and published in the newspapers, that the failure to punish Schroeder was because of some bargain between the friends of the engineman and the officers of the law.

Mayor Harrison, of Chicago, has taken some of the life out of the agitation for electrification of the Chicago railway terminals, which was revived last week by the appointment of the city council committee on railway terminals, and the introduction of a resolution providing for immediate action on the question, by announcing that he will endeavor to have the council settle the questions of telephone and electric light regulation, and also the local transportation question, before taking up electrification.

A bill has been introduced in the Canadian Parliament to regulate changes of railway terminal and division points. It proposes that a railway shall secure the approval of the Railway Commission before changing a terminal or divisional point; and that when such a change is made employees forced to move to another town shall be compensated for their loss by the railway company; and in case of dispute the amount to be paid by the road shall be fixed by the Dominion Railway Commission.

The elaborate report on the financial condition of the New York, New Haven & Hartford, which has been made to the

Interstate Commerce Commission by its accountants and examiners has been the subject, during the past week, of a public hearing in Boston, presided over by Commissioner C. A. Prouty. Officers of the New Haven, and also of the Boston & Maine were questioned, and Mr. Brandeis, appearing as counsel for a Boston merchants' association, was allowed to cross question. The counsel for the New Haven protested that the government's report was being made public, and the officers of the road questioned concerning it, before they had had an opportunity to examine it.

There is a bill before the New York legislature, No. 1897, introduced by Mr. Cronin, providing that motormen of multiple-unit electric trains shall have had at least one year's experience on a steam or electric railroad, and must be familiar with train rules, train orders, standard code signals, etc. If this bill should become a law it would produce on the electric zones of the New York Central and of the New Haven and on the Interborough Rapid Transit Lines in New York City the same conditions that prevailed in Yonkers, N. Y., a few months ago, when, because of a strike of motormen, the street railroads were tied up absolutely, an ordinance of the city forbidding the employment of inexperienced men as motormen.

Governor Major, of Missouri, has signed a bill requiring foreign railway corporations operating in the state to incorporate in Missouri, and also the full crew law, requiring three brakemen on all freight trains of 40 cars or more, and a flagman and a brakeman on all passenger trains of six cars or more. In a statement regarding the incorporation law he states that it cannot be applied to roads now operating in the state, but only to those which seek to enter the state in the future. In a statement regarding the full crew law he says that the increase in the length and speed of trains and the volume of traffic without any increase in the number of men handling such trains, "no doubt accounts for the increase in the number of men killed and injured, and our increased number of wrecks and tieups. The addition of one man on these long trains would give better facilities for detecting defects and inspecting the condition of the train while in transit, thereby reducing the chances of wrecks and tieups."

The "New England Conference on Transportation," organized at the suggestion of the governor of Massachusetts, met in Boston last Wednesday, and discussed the general proposition of uniform railroad legislation with the Massachusetts legislative committee on railroads. Representatives were present from all the New England states except New Hampshire. The meeting was called by Gov. Baldwin, of Connecticut, chairman of the Conference. The states were represented as follows: Maine, F. W. Cram, C. H. Osgood; Vermont, William B. Howe, Percival H. Clement; Massachusetts, Marcus P. Knowlton, Francis T. Bowles and the Governor; Rhode Island, William C. Bliss and Marsden J. Perry; Connecticut, George M. Woodruff and Costello Lippett. A temporary organization was effected by the selection of Percival Clement as chairman and Francis T. Bowles as secretary. These with Mr. Cram were made a committee to confer with President Wilson and the governors of the New England states in regard to the scope of the work desirable for the Conference to undertake, and to report at a meeting to be called by the temporary chairman.

Locomotive for University of Illinois Testing Plant.

The first locomotive to be tested in the new locomotive laboratory of the College of Engineering of the University of Illinois arrived on April 11. The locomotive is an Illinois Central large, modern freight engine, No. 958, lent to the university temporarily for testing purposes. It is of the consolidation type, eight driving wheels coupled. Its total weight, with the tender, is 182 tons, with 100 tons on the driving wheels.

Telephones in the Floods.

The remarkable usefulness of the telephone in the distressing conditions that prevailed in Ohio and Indiana during the last week in March is known to all readers. The emergency work done by the different companies would make a story filling a volume. The Bell companies, all working in unison with the parent company in New York, not only utilized all of their ordinary resources, by no means small, but also spent thousands

of dollars on special transportation and extra work in shops, and in the field. The Western Electric Company shipped 125 tons of telephone cable to Ohio, from New York City, by express. A trainload of poles was shipped from the company's yards in Michigan. The shops at Hawthorne, Ill., were at once put to running 24 hours a day, and shipments from the warehouses at Hawthorne and other cities were started by passenger train within a few hours after the flood became dangerous. The company at once ordered from the Pacific coast 50,000 cross-arms, and material for indoor facilities was drawn from the company's reserve stocks at Boston, New York, Philadelphia, Richmond, Atlanta, Kansas City, St. Louis, Minneapolis and Dallas. The sleet storm of February 20 already had brought a demand on the Chicago shops for over 200 tons of copper wire, besides large quantities of office hardware. To Dayton alone 5,000 telephone sets were shipped, and 40 private exchange equipments. At Dayton and other cities, where the telephone exchanges, being in the second or third stories of buildings, were able to continue in operation even after the streets were flooded, operators were taken to and from their work in boats. The American Telegraph & Telephone Company lost 4,000 poles in the floods, and the Western Union 8,000. These figures give some little idea of the losses of wires and the labors of the linemen.

A Condensed Analysis.

It seems very simple to see the trains run in and out of the station; to order the freight car and send the grain to market; to telegraph to the city for supplies, and in 24 hours have them delivered. But it is not so simple as it seems, and there is danger today that the next great uplift in business will find the railroads sorely taxed to furnish the transportation needed for the commerce of the country. Why? Because a misdirected public opinion is demanding rates too low, taxes too high, wages too high, service too elaborate; and there are not cents enough in the dollar to meet all these obligations and still permit the business to be attractive enough so the man with the dollar will invest it. Our American railroads have done good work, and can do better, and it is to the farmers' selfish interest to see that they are so treated that they will be ready at all times to handle business. To be ready requires constant expenditure.—*Leslie's Weekly*.

Proposed Utility Commissions in Illinois.

A joint committee appointed by the Illinois legislature two years ago has submitted a report recommending a single state commission to regulate all public utilities in this state, and strongly opposing the proposal for separate commissions for the state and for the city of Chicago. The report severely criticises the handling of questions of public utility regulation by the city of Chicago in recent years, and also objects to separate commissions on the ground that two commissions would inevitably lead to conflicts in authority. A bill introduced in the legislature to carry out these recommendations provides for a state public utility commission of five members at a salary of \$10,000 each, two to be appointed from Chicago, and one each from northern, central and southern Illinois, with broad powers over all utilities except steam railroads, which are to be left for the present under the jurisdiction of the present railroad and warehouse commission. Governor Dunne's bill providing for a state public utilities commission, and giving Chicago and all other cities having a population of over 25,000 the option of regulating their own public utilities or delegating this power to the state commission, has also been introduced. The administration bill abolishes the present railroad and warehouse commission. A third bill has been introduced on behalf of the minority of the joint committee, which would create a state commission and a separate commission to handle Chicago affairs, the Chicago commission to be appointed by the mayor.

Rigid Rules.

The Pennsylvania Railroad has established a rule which will debar from employment in its dining car and restaurant department any person with even a tendency toward a communicable disease. There is to be a quarterly physical examination of every employee who has anything whatsoever to do with the preparation or serving of food; dishwashers, kitchen helpers, cooks and waiters; and only with a 100 per cent. report can they

remain in the service. The further precaution is taken of debarring these defectives from employment in places where linens and tableware are kept. At "lay-over points" for dining car stewards, waiters and cooks, special lodgings are provided, with clean linens, clean beds and every sanitary protection. These lodgings are inspected by the superintendent of dining cars and restaurants, by service inspectors, and by medical examiners of the company.

The Three-Dollar Demurrage Rate.

With the successful results of a high charge for demurrage on freight cars in California our readers are well acquainted. Within the last few months a rate of \$3 has been charged on interstate as well as intrastate shipments, and the change, as was to be expected, has proved of marked benefit. Mr. Mote, manager of the Pacific Car Demurrage Bureau, prints a letter from J. P. Thomas, agent of the San Pedro, Los Angeles & Salt Lake, at Los Angeles, telling of the improvement as follows:

"When this \$3 rate on interstate cars became effective, our yard efficiency was almost immediately increased because of the tendency on the part of consignees to dispose of shipments immediately upon arrival, instead of allowing them to be placed on the hold-track. This largely decreases the average number of switching moves on cars and thereby lessens not only the congestion in the yard, but the danger of damage to cars and contents by continued switching.

"I find that we also have less disputes with consignees as to the correctness of demurrage charges, doubtless due to the fact that the higher rate tends to the keeping of more accurate records by consignees. Station and yard employees are very much gratified with the results."

Chicago Switchmen's Controversy Settled.

The controversy between the yardmen and the railways in the Chicago district regarding wages and working conditions, was settled on April 17, by a compromise reached after several weeks of negotiations conducted by Commissioner of Labor Neill, and his assistant, G. W. W. Hanger, under the mediation provisions of the Erdman act. Although the railways conceded most of the demands of the men, the agreement omits the rule on which they had most strongly insisted, providing for the payment of time and a half for overtime, Sundays and holidays. The concessions gained by the men include an increase of wages for a number of men in "backup" service—backing passenger trains to and from train sheds—a rule giving yardmen a right to handle milk runs in the Chicago switching district, compensation for time on account of attending investigations and re-examinations, a concession of 30 minutes in the starting time rule, one day's pay for yardmen when called and not used, and other minor provisions regarding employment.

Fast Handling of Emergency Order for Levee Protection.

At noon on Monday, April 7, the Carnegie Steel Company, of Pittsburgh received an emergency order for 500 tons of U. S. steel sheet piling, to be forwarded to New Orleans, to reach that point not later than April 17, for installation in the LaFourche District for the protection of the levees.

The order was the result of a decision to take precautionary measures in anticipation of what extraordinarily high water might cause, on the part of the Texas & Pacific and New Orleans & Northeastern railroads, acting in conjunction with the commissioners of the LaFourche levee district, and Captain Sherrill of the U. S. engineer corps, the government officers having arranged to drive the sheet piling with their apparatus immediately on arrival. Owing to extraordinary efforts put forth by the makers of the steel and the carriers which transported it, the date set was anticipated by three days, a remarkable achievement on the part of the railroads, particularly between Pittsburgh and Cincinnati, considering the soft condition of the tracks, bridges, and culverts, owing to recent floods.

The rolling was begun at midnight April 7, and proceeded with continuously until Wednesday night, April 9. The piling, after rolling, was promptly cut and punched, and loaded into a special train of 12 cars, consisting of steel gondolas and steel underframe gondolas of the Baltimore & Ohio. Cars were

previously carefully inspected while empty, and the last car of the train was weighed at the Hayes Yard of the Union Railroad at 11:50 a. m. Thursday, April 10; delivery was made by the Union Railroad to the Baltimore & Ohio at Port Perry Transfer, at 12:18 p. m., after which the train was switched to the Glenwood yards of the Baltimore & Ohio, and another minute examination made of the cars under load, so as to avert any possible transportation danger to the equipment, owing to the fast running required. The train was then promptly despatched by the Baltimore & Ohio, reaching Benwood, W. Va., at 10 p. m. Thursday night, April 10, and immediately delivered to the Ohio River division of the Baltimore & Ohio for movement thence to Parkersburg, at which point it arrived at 5:22 a. m., Friday, April 11. It was transferred at once to the higher line of the Baltimore & Ohio Southwestern, leaving at 6:30 a. m., April 11, which line brought the train into Cincinnati at 2:45 a. m., Saturday, April 12. Prompt transfer at Cincinnati was made to the Queen & Crescent route, but here a delay of several hours ensued, necessitating revision of part of the lading in order to avert danger while crossing the Ohio river, as it was not known to what extent, if any, the floods might have weakened the bridge. The train finally started towards New Orleans at noon Saturday, April 12, on a schedule that approximated 20 miles an hour, to complete the last leg of the journey, 836 miles (out of a total journey, from point of origin to destination, of 1,236 miles). Birmingham, Ala., 481 miles out, was passed at 8 o'clock Sunday morning, April 13, and at 3:30 p. m. the train passed Meridian, Miss., 200 miles from New Orleans, reaching the last named city at 3:15 a. m., Central time, Monday, April 14.

Thus, the order was received, executed, loaded, shipped and delivered at destination in less than one week from the time it was received, under all the adverse conditions and circumstances that presented themselves. Owing to wash-outs on the B. & O. regular route to Cincinnati, an alternate route via Benwood and Parkersburg had to be selected, lengthening the distance to Cincinnati approximately 40 miles, and the movement of the freight was necessarily slow at times, because of soft track and other conditions, due to the floods.

New Harriman Dissolution Plan.

Robert S. Lovett, chairman of the executive committee of the Union Pacific, appeared before Circuit Judges Sanborn, Hook and Smith at St. Paul, Minn., on April 21, and presented a motion for an extension of time in the Union Pacific-Southern Pacific dissolution proceedings until July 1, together with a revised plan for the separation of the roads. The motion was taken under advisement following the receipt of a telegram from the attorney general declaring his acquiescence in the plan for the extension. A synopsis of the new tentative plan was given out, including the following points:

"The amended plan in brief is that the entire \$126,650,000 in Southern Pacific stock to be distributed shall be deposited with a trustee and disfranchised while so held; that certificates of interest shall be issued by the trustee against said shares, which shall carry no voting right and which shall be exchangeable for Southern Pacific shares held by the trustee only on the filing of an affidavit by the applicant for such exchange, showing that such applicant does not own 1,000 shares or more of Union Pacific stock, and that these certificates of interest shall be offered for subscription and purchase to all Union Pacific stockholders at a distribution ratio of not less than 38 per cent.

"The largest Union Pacific stockholders (368 in number, according to the September stock list, which was before the Supreme Court) are by this amended plan excluded from the acquisition of any of the Southern Pacific shares to be distributed. They may purchase their ratable shares of the certificates of interest, but they cannot themselves convert the certificates of interest into the deposited shares.

"Even if it be assumed that any concert of action by the 21,782 holders of Southern Pacific stock, resulting in a control of the elections of the Southern Pacific company, were possible, the effect would not be to continue the previous combination. These 21,782 holders, assumed to be able to control the Southern Pacific company by the holding of virtually 46 per cent. of its stock, are not in control of the Union Pacific Railroad Company and are not able to elect its directors, since the aggregate holdings of Union Pacific stock amount to only 37.2 per cent. of the Union

Pacific stock, and as the remaining 368 stockholders hold 62.8 per cent., they naturally represent the controlling interest of the Union Pacific company.

"The certificates of interest acquired on the open market will still be subject to the condition that they cannot be converted into stock by any Union Pacific shareholder holding 1,000 shares or more."

After this plan had been informally submitted a statement was given out by the court as follows:

"Circuit Judges Sanborn, Hook and Smith are not concerning themselves regarding the sale of Central Pacific stock, as this phase of the situation was not mentioned in tentative plan, but are confining their attention to the disposition of the \$126,650,000 of Southern Pacific stock which is now unlawfully held by the Union Pacific Railroad Company.

"In this connection the following suggestions have been submitted by the judges to counsel for the Union Pacific, and also to District Attorney Hought, of St. Paul, representing the government for Attorney-General McReynolds, as a guidance in future dissolution plans:

"1. Any plan for disposing of the \$126,650,000 of Southern stock owned by the Union Pacific company should have regard to the amount of Southern Pacific stock already owned by Union Pacific stockholders, so that the present holdings of these stockholders as a body shall not, by the affirmative action of this court, be increased to the point of practical control of the competing company.

"2. In the memorandum of March 1, 1913, submitted by counsel for the Union Pacific Company, to a very large extent the 23,000 individual stockholders of the Union Pacific are also included among the 15,000 stockholders of the Southern Pacific Company.

"3. It was intimated at a time when it was supposed that Union Pacific stockholders did not hold more than \$50,000,000 of the stock of the Southern Pacific Company that not more than \$40,000,000 of the Southern stock should be transferred to Union Pacific stockholders. It now appears that the stock books of the two companies of February, 1913, show that 4,440 Union Pacific stockholders also own \$92,162,400 of Southern Pacific stock, exclusive of the \$126,650,000 of stock involved in this suit. Among these 4,440 stockholders are brokerage concerns whose principals are undisclosed, but if they were excluded the fact would still remain that individual Union Pacific stockholders own a very large amount of Southern Pacific stock.

"In view of these facts it seems that the disposition of as much as \$40,000,000 of Southern Pacific, with voting power to the stockholders of the Union Pacific might give practical control of that company to Union Pacific stockholders and the question of what amount, if any, of the Southern Pacific may be safely transferred to them is suggested for an argument and consideration."

A New Cunarder Launched.

The Cunard steamship Aquitania was launched at Glasgow last Monday. The Aquitania is the largest steamship ever built in Great Britain, about 47,000 gross tonnage. The vessel is 901 ft. long and has engines of more than 70,000 h. p. It is expected that her speed will be about 23 knots, considerably less than that of the Lusitania and the Mauretania. The Aquitania will have a double skin throughout the vulnerable part of the vessel, the two skins being separated by a space of about 15 ft.

A. R. E. A. Rail Committee.

Last week we published on page 902 a list of the names of the members appointed for A. R. E. A. 1913 committee assignments. The data for the rail committee was not then available and is as follows:

COMMITTEE IV.—RAIL.

1. Recommend standard rail sections.
2. Continue investigation of rail failures and deduce conclusions therefrom.
3. Continue special investigation of rails.
4. Make comparative study and report on designs for joints, and recommend standard spacing for bolt holes and spike slots.

J. A. Atwood, P. & L. E., chairman; W. C. Cushing, P. L. W., vice-chairman; Chas. S. Churchill, N. & W.; R. Montfort, L. & N.; E. B. Ashby, L. V.; A. S. Baldwin, I. C.; M. L. Byers, D. & H.; F. A. Delano, Wabash; P. H. Dudley, N. Y. C.; S. H. Ewing, P. & R.; L. C. Fritch,

C. G. W.; C. W. Huntington, C. R. R. of N. J.; John D. Isaacs, S. P.; Thos. H. Johnson, P. L. W.; Howard G. Kelley, G. T.; C. A. Morse, C. R. I. & P.; Geo. W. Kittredge, N. Y. C. & H. R.; J. P. Snow, Cons. Eng.; A. W. Thompson, B. & O.; R. Trimble, P. L. W.; M. H. Wickhorst; G. M. Davidson, C. & N. W.; A. H. Hogeland, G. N.; H. B. MacFarland, A. T. & S. F.; C. F. Loweth, C. M. & St. P.; Geo. W. Vaughan, N. Y. C. & H. R.

Western Railway Club.

An invitation of Dr. W. F. M. Goss, dean of the College of Engineering, and director of the Engineering Experiment Station of the University of Illinois, to the members of the Western Railway Club to attend the formal dedication of the new transportation building, the locomotive laboratory, and the mining laboratory, on May 9, has been accepted by the club, and arrangements are being made for a special train if a sufficient number of members signify their intention of going. The dedicatory programme includes many distinguished speakers representing the railway and mining interests of the country. The locomotive testing plant will be in full operation, and special tests will be conducted. Practically all of the technical organizations of the state have been invited to participate in the exercises.

The Railway Safety First Association.

The chairmen of the safety departments of thirty-four railways met in Chicago last Monday for the purpose of organizing the Railway Safety First Association, the purpose being to establish an association in which shall be represented all railroads in North America on which safety departments have been or shall be organized. A. W. Smallen, chairman of the general safety committee of the Chicago, Milwaukee & St. Paul was chosen chairman of a committee to effect a permanent organization. It was voted to ask the American Railway Association, at its meeting next month, for recognition by that association.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

- AIR BRAKE ASSOCIATION.**—F. M. Nellis, 53 State St., Boston, Mass. Convention, May 6-9, St. Louis, Mo.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.**—A. G. Thomason, Boston, Mass. Convention, May 20, Chicago.
- AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.**—W. C. Hope, New York.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.**—R. O. Wells, East St. Louis, Ill. Annual meeting, June 17-20, Buffalo, N. Y.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.**—E. H. Harman, St. Louis, Mo.; 3d Friday of March and September.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.**—H. C. Donecker, 29 W. 39th St., New York.
- AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.**—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.
- AMERICAN RAILWAY ASSOCIATION.**—W. F. Allen, 75 Church St., New York. Next meeting, May 21, New York.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.**—C. A. Lichty, C. & N. W., Chicago. Convention, October 21-23, 1913, Montreal.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.**—E. H. Fritch, 900 S. Michigan Ave., Chicago.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.**—J. W. Taylor, Old Colony building, Chicago. Convention, June 11-13, Atlantic City, N. J.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.**—A. R. Davis, Central of Georgia, Macon, Ga.
- AMERICAN SOCIETY FOR TESTING MATERIALS.**—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.; annual, June, 1913.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.**—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
- AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.**—J. R. Wenlinger, 11 Broadway, New York; 2d Tuesday of each month, New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.**—Calvin W. Rice, 29 W. 39th St., New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.**—F. J. Angier, B. & O., Baltimore, Md. Next convention, January 20-22, 1914, New Orleans, La.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.**—C. G. Phillips, 143 Dearborn St., Chicago. Annual meeting, May 28, Atlantic City, N. J.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.**—J. R. McSherry, C. & E. I., Chicago. Next meeting, May, 1913, Baltimore, Md.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.**—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual meeting, June, 1913, Atlantic City, N. J.; annual convention, October 18-24, Chicago.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.**—P. W. Drew, 112 West Adams St., Chicago; annual, May 20, 1913, St. Louis, Mo.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.**—G. P. Conard, 75 Church St., New York.
- ASSOCIATION OF WATER LINE ACCOUNTING OFFICERS.**—W. R. Evans, Chamber of Commerce, Buffalo, N. Y. Annual meeting, October 8, Philadelphia, Pa.
- BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.**—H. A. Neally, Joseph Dixon Crucible Co., Jersey City, N. J. Meeting with American Railway Bridge and Building Association.
- CANADIAN RAILWAY CLUB.**—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.**—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursday, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.**—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
- CENTRAL RAILWAY CLUB.**—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
- CIVIL ENGINEERS' SOCIETY OF ST. PAUL.**—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.
- ENGINEERS' SOCIETY OF PENNSYLVANIA.**—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.**—E. K. Hiles, Oliver building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
- FREIGHT CLAIM ASSOCIATION.**—Warren P. Taylor, Richmond, Va. Next convention, June 18, Bluff Point, N. Y.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.**—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
- INTERNATIONAL RAILWAY CONGRESS.**—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.
- INTERNATIONAL RAILWAY FUEL ASSOCIATION.**—C. G. Hall, 922 McCormick building, Chicago. Annual meeting, May 21-24, Chicago.
- INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.**—Wm. Hall, 829 West Broadway, Winona, Minn. Next convention, July 15-18, Chicago.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.**—A. L. Woodworth, Lima, Ohio. Annual meeting, August 18, Richmond, Va.
- MAINTENANCE OF WAY & MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.**—W. G. Wilson, Lehigh Valley, Easton, Pa.
- MASTER BOILER MAKERS' ASSOCIATION.**—Harry D. Vought, 95 Liberty St., New York. Convention, May 26-29, 1913, Chicago.
- MASTER CAR BUILDERS' ASSOCIATION.**—J. W. Taylor, Old Colony building, Chicago. Convention, June 16-18, Atlantic City, N. J.
- MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.**—A. P. Dane, B. & M., Reading, Mass. Annual meeting, September 9-12, Ottawa, Can.
- NATIONAL RAILWAY APPLIANCE ASSOC.**—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.
- NEW ENGLAND RAILROAD CLUB.**—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
- NEW YORK RAILROAD CLUB.**—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
- NORTHERN RAILROAD CLUB.**—C. L. Kennedy, C. & St. P., Duluth, Minn.; 4th Saturday, Duluth.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.**—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Thursday.
- RAILROAD CLUB OF KANSAS CITY.**—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
- RAILWAY BUSINESS ASSOCIATION.**—Frank W. Noxom, 2 Rector St., New York. Annual dinner, second week in December, 1913, New York.
- RAILWAY CLUB OF PITTSBURGH.**—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
- RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.**—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.
- RAILWAY GARDENING ASSOCIATION.**—J. S. Butterfield, Lee's Summit, Mo. Next meeting, August 12-15, Nashville, Tenn.
- RAILWAY DEVELOPMENT ASSOCIATION.**—W. Nicholson, Kansas City Southern, Kansas City, Mo.
- RAILWAY SIGNAL ASSOCIATION.**—C. C. Rosenberg, Bethlehem, Pa. Meetings, June 11-12, New York; convention, October 14, Nashville, Tenn.
- RAILWAY STOREKEEPERS' ASSOCIATION.**—J. P. Murphy, Box C, Collinwood, Ohio. Annual convention, May 19-21, Chicago.
- RAILWAY SUPPLY MANUFACTURERS' ASSOC.**—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. Assocs.
- RAILWAY TEL. AND TEL. APPLIANCE ASSOC.**—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Elec. Engrs.
- RICHMOND RAILROAD CLUB.**—F. O. Robinsor, Richmond, Va.; 2d Monday except June, July and August.
- ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.**—L. C. Ryan, C. & N. W., Sterling, Ill. Convention, September 8-12, 1913, Chicago.
- ST. LOUIS RAILWAY CLUB.**—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
- SIGNAL APPLIANCE ASSOCIATION.**—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
- SOCIETY OF RAILWAY FINANCIAL OFFICERS.**—C. Nyquist, La Salle St. Station, Chicago.
- SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.**—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.**—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
- TOLEDO TRANSPORTATION CLUB.**—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
- TRACK SUPPLY ASSOCIATION.**—W. C. Kidd, Ramapo Iron Works, Hillsburn, N. Y. Meeting with Roadmasters' and Maintenance of Way Association.
- TRAFFIC CLUB OF CHICAGO.**—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
- TRAFFIC CLUB OF NEW YORK.**—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
- TRAFFIC CLUB OF PITTSBURGH.**—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
- TRAFFIC CLUB OF ST. LOUIS.**—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
- TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.**—J. F. Mackie, 7042 Stewart Ave., Chicago. Annual meeting, June 17, Los Angeles, Cal.
- TRANSPORTATION CLUB OF BUFFALO.**—J. M. Sells, Buffalo; first Saturday after first Wednesday.
- TRANSPORTATION CLUB OF DETROIT.**—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
- TRAVELING ENGINEERS' ASSOCIATION.**—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Annual meeting, August, 1913, Chicago.
- UTAH SOCIETY OF ENGINEERS.**—R. B. Ketchum, University of Utah, Salt Lake City, Utah; 3d Friday of each month, except July and August.
- WESTERN CANADA RAILWAY CLUB.**—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.**—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
- WESTERN SOCIETY OF ENGINEERS.**—J. H. Warder, 1735 Monadnock block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Merchants' Association, New York City, has moved its offices from 54 Lafayette street to the Woolworth Building, 233 Broadway.

Ralph C. Richards, general claim agent of the Chicago & Northwestern, addressed the Traffic Club of Chicago at its monthly luncheon on April 22, on the subject of "Safety First."

Hon. B. H. Meyer, of the Interstate Commerce Commission, also gave a short talk.

Beginning on June 1 tickets between St. Paul and Minneapolis and the Pacific coast both over the Northern Pacific and the Great Northern, will be made optional via Duluth with stop-over privileges. The change is made after considerable agitation by the Duluth commercial interests, who have also been trying to persuade the roads to run through passenger trains to the coast from Duluth.

J. S. Marvin, traffic manager of the National Association of Automobile Manufacturers, has addressed a letter to railway officers throughout the country, complaining that special cars for automobile shipments after being unloaded are too frequently used as ordinary box cars and retained in local service, or reloaded and routed at variance with railway rules and without regard to the requirements of the automobile industry. He urges special attention to keeping these cars in the service for which they are intended.

About 70 manufacturers and shippers of Chicago have arranged a special train containing exhibits of their products, which is being sent out through the territory tributary to Chicago for the purpose of trade promotion. The train consists of six exhibition coaches, two sleepers and a diner. Stops of from one to three days will be made in each city, and the public will be invited into the train, where the exhibits will be explained by representatives. The first trip is to be through Indiana, and will cover seven weeks, during which 28 cities will be visited.

The Queen & Crescent Route, when the recent floods interrupted service on all the direct lines, put on through sleeping cars between Cincinnati and New York, running them on the "Carolina Special" via Harriman Junction, Knoxville and the Southern Railway. By this route a large number of passengers were carried to eastern points. The distance is 1,142 miles, or 391 miles greater than by the direct route. The Ohio river at Cincinnati on April 1, reached a stage of 69.8 ft., but the Queen & Crescent maintained freight and passenger traffic with the South without interruption. When the high water made the use of the regular passenger station impossible, a temporary station with a platform was established on McLean avenue, which withstood the highest stages of water.

A new plan of improving the relations between railways and shippers was inaugurated by officers of the Southern Pacific, the St. Louis & San Francisco, the Texas Midland and the Pacific Fruit Express, at Houston, Tex., last week. The shippers were invited to attend a meeting of railway officers presided over by F. M. Lucore, assistant general manager of the Sunset-Central Lines, to discuss such subjects as the movement and distribution of empty cars, through schedules to St. Louis, Kansas City and Chicago, terminal changes and car inspection, icing arrangements, re-consignments, arrival notices and tracers. The railways have usually held such meetings to make plans for the movement of the fruit and vegetable crop, and it was decided to make the meeting an open one, in order that shippers might see what efforts were being made in their behalf, and to allow them to participate.

Chairman Mayfield, of the Texas Railroad Commission, and Commissioner Watson, of the Oklahoma commission, recently addressed letters to the Interstate Commerce Commission asking an investigation of the action of the Southwestern Passenger Association in refusing a special rate of one cent a mile on account of the Confederate veterans' reunion to be held at Chattanooga. The railways announced a rate of two cents a mile. Commissioner Clements replied that the Commission felt it "could hardly

with propriety undertake to influence the carriers to make lower rates in any instance than they could lawfully be required to do; for, while the carriers may, under the law, as they often do, establish special fares for attendance on conventions, reunions, etc., we did not feel justified in urging them to do so, for the reason that it is our duty to pass upon the question of reasonableness of rates, fares and practices of the carriers and the lawfulness thereof."

The bi-monthly dinner and business meeting of the Traffic Club of Pittsburgh was held on April 14 at the Hotel Schenley. The feature of the program was a series of moving pictures entitled "Mine to Molder," presented by Henry B. Yergeson, of Rogers, Brown & Co. The pictures portrayed the various stages in the movement of iron ore from the mines in the Lake Superior region through the various processes to the finished rail in the plant of the Lackawanna Steel Company. At the conclusion of the entertainment features a business meeting was held and a nominating committee was appointed to select candidates for the offices of the club to be voted on at the annual election in June. The committee includes: G. G. Herring, general agent, Southern Pacific; F. A. Ogden, division freight agent, Jones & Laughlin Steel Company; C. L. Cordes, division freight agent, American Steel & Wire Company; Robert Main, division freight agent, Canadian Pacific, Soo Line; L. C. Bihler, traffic manager, Carnegie Steel Company; C. S. Belsterling, traffic manager, American Bridge Company; J. C. Kimes, commercial freight agent, Baltimore & Ohio.

Federal versus State Authority.

In the Supreme Court of the United States last Monday, Assistant Attorney General Denison asked permission to file a brief, *amicus curiae*, in the pending state rate cases. Similar questions are involved in cases pending before the Commerce Court. There are forty-five cases, including the Minnesota case, and the government asked simply for leave to file the brief which it has filed before the Commerce Court in the Houston East & West Texas et al vs. United States, and Texas & Pacific vs. United States (the Shreveport cases). Mr. Denison said: "As cause for this motion it is shown that the above mentioned cases involve some of the fundamental points at issue in the state railroad rate cases. The questions have been argued before the Commerce Court, but have not been decided by that court, and it is hardly expected that they will be decided until this court has passed upon the matter." The question is "whether a state may deliberately shut out interstate commerce by the adroit manipulation of intrastate freight rates; and whether, where this manipulation results in a discrimination against the interstate shipments, the Interstate Commerce Commission may correct it." The court granted the government's application; which is supposed to mean the indefinite postponement of a decision in the cases.

Of the forty-five cases pending, the most important is the "Minnesota rate case," based on the railroads' dispute of the order by the Minnesota commission, in 1907, calling for a reduction in certain freight rates of as much as 25 per cent., and supplemented by an act of the Minnesota state legislature ordering further reductions. The roads contended, among other things, that the new rates would make impossible a fair return on the invested capital and that thereby the state tariff, through rendering non-remunerative the rates for traffic within the state, threw a burden on interstate traffic, which made it impossible for the companies to observe the federal Interstate Commerce Commission's orders without loss.

In September, 1910, a special master in chancery appointed to take testimony reported in favor of the railways on both points. In April, 1911, Judge Sanborn approved the master's decision, incidentally holding that 7 per cent. net income on the approved value of a railway's property was not more than a fair return. Later in 1911 the case went to the United States Supreme Court on the appeal of the State of Minnesota. In April, 1912, a brief was filed with the Supreme Court by Governors Harmon of Ohio, Hadley of Missouri, and Aldrich of Nebraska, protesting against Judge Sanborn's decision, on the ground that if sustained it would subordinate state rights to railroad rights, and would involve the destruction of the state's control over its own internal affairs.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended from March 31 until September 30, certain tariffs which propose to cancel joint rates in connection with the Chicago, Zeigler & Gulf.

The commission has suspended from April 17 until August 15, the supplement to the tariff of the St. Louis, Rocky Mountain & Pacific, which contains schedules withdrawing the present through joint rates applicable to the transportation of bituminous coal from mines located on the St. Louis, Rocky Mountain & Pacific in New Mexico to points in Oklahoma, Nebraska, Kansas and other states located on the Rock Island Lines, and providing that on and after April 17, 1913, combination rates will apply. This results in advances ranging from 50 cents to \$2.50 per ton.

The Interstate Commerce Commission will hold a public hearing on proposed amendments of or additions to its regulations governing the transportation of explosives and other dangerous articles in Washington, D. C., on May 26. Prior to the date of hearing, it is understood that Col. B. W. Dunn, chief inspector of the Bureau for Safe Transportation of Explosives, will prepare and distribute printed copies of proposed changes and additions to the regulations. All parties who desire to suggest changes, should submit them at once to Col. Dunn, as well as to the commission.

The commission suspended from April 15 until April 30, certain items contained in the tariff of the Oregon-Washington Railroad & Navigation Company, which would cancel through joint rates applicable to the transportation of wool and mohair, c. l., from points in Oregon, Washington and Idaho routed via Wallula, Wash., the Northern Pacific and eastern connections to Chicago, New York, Boston and other points. Tariffs of other carriers canceling through rates via Spokane, Denver and certain other western gateways were suspended until the same date by orders previously entered in same docket.

The commission has suspended from April 12 until August 9, the supplement to the tariff of the Pennsylvania Railroad, which contains schedules advancing rates for the transportation of petroleum and its products, in carloads, from Emlenton, Pa., and a number of other points located on the Pennsylvania Railroad north of Pittsburgh and south of Franklin, Pa., to Detroit, Mich., Milwaukee, Wis., and other points of destination. The advances range from $\frac{1}{2}$ to 2 cents per 100 lbs. Complaint was made that the proposed rates would create a discrimination in favor of Franklin and Oil City, more distant points, from which no increase in rates is proposed, and from which similar traffic would move at lower rates, via Emlenton and the other points affected, to the same destinations.

Commissioner B. H. Meyer began a hearing at Chicago on April 21, on a complaint filed by the Chicago Board of Trade against the Illinois Central, Atchison, Topeka & Santa Fe, Chicago & Eastern Illinois, Wabash and Chicago & Alton, alleging failure on the part of these roads to absorb the switching charges and to apply Chicago rates to and from Chicago points on grain as on other commodities. The complaint grows out of the reciprocal switching agreement which was put into effect in Chicago two years ago as the result of a long series of conferences between the carriers and the shippers, which failed to provide for the absorption of switching charges on grain, coal, coke and live stock, because the five defendant roads would not agree to the plan. In other respects the plan was allowed to go into effect after a hearing before the commission with the thought that the agreement might at a later date be extended to cover the commodities excepted.

Complaint Dismissed.

Merchants' Freight Bureau of Little Rock, Ark., v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Clements:

The commission decided that the rate of 17 cents per 100 lbs., for the transportation of cement from Kansas Gas Belt points to Little Rock, Ark., was not shown to be unreasonable. (26 I. C. C., 543.)

McKnight Keaton Grocery Company v. Chicago, Milwaukee & St. Paul et al. Opinion by the commission:

The complainant contends that the rate of 49½ cents per 100 lbs., for the transportation of cheese in less than carloads from

Plymouth, Wis., to Cairo, Ill., is unreasonable. The commission found that the evidence was not conclusive. (26 I. C. C., 563.)

Board of Improvements, Waterworks District No. 1, Fort Smith, Ark., v. St. Louis & San Francisco et al. Opinion by Commissioner Clements:

The commission decided that the rate of \$6.85 per net ton for the transportation of cast iron pipe and connections from Chattanooga, Tenn., to Fort Smith, Ark., was not shown to have been unreasonable. (26 I. C. C., 541.)

Chamber of Commerce, City of Augusta, Ga., v. Buffalo, Rochester & Pittsburgh et al. Opinion by Commissioner Clements:

The commission decided that the rate of 37 cents per 100 lbs., for the transportation of apples, potatoes, cabbage and onions from Rochester, N. Y., to Augusta, Ga., was not shown to have been unreasonable. (26 I. C. C., 559.)

Board of Improvements, Waterworks District No. 1, Fort Smith, Ark., v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Clements:

The commission decided that the rate of 15 cents per 100 lbs., for the transportation of cement from Kansas Gas Belt points, Ada, Okla., Bonner Springs, Kan., and Sugar Creek, Mo., to Fort Smith was not unreasonable. (26 I. C. C., 539.)

Goldfield Consolidated Milling & Transportation Company v. Atchison, Topeka & Santa Fe et al. Opinion by the commission:

In this case the complainant contends that the rate of \$2.08 per 100 lbs., for the transportation of cyanide of potassium in carloads from San Diego, Cal., to Goldfield, Tonopah and Millers, Nev., is unreasonable to the extent that it exceeds \$1.16 per 100 lbs. Reparation is asked. Prior to January 2, 1911, this rate was \$2.37 per 100 lbs. The commission decided that as the present rate was considerably lower than when the complainant's industries were established, and as the traffic of the commodity in question was light and the earnings of the principal defendant were small, no change should be made in the rate in question. (26 I. C. C., 567.)

Ash Lumber Rate Reduced.

J. R. Shoupe & Company v. Trinity & Brazos Valley. Opinion by the commission:

The complainant contends that the rate of 42 cents per 100 lbs., for the transportation of ash lumber in carloads from Jackson, Tex., to St. Louis, Mo., is unreasonable to the extent that it exceeds 19 cents per 100 lbs. Reparation is asked. The commission found that the present rate was excessive and decided that as a rate of 24 cents per 100 lbs., would yield a revenue of about 5 mills per ton per mile, it would be just and reasonable. That rate was prescribed for the future. Reparation was awarded. (26 L. C. C., 570.)

Through Routes and Joint Rates on Grain Established.

Omaha Grain Exchange v. Chicago, Burlington & Quincy et al. Opinion by Chairman Clark:

The complainant seeks the establishment of a through route and joint rates from points on the line of the Great Northern between Great Falls and Billings, Mont., to Omaha, Neb., via Billings, over the lines of the Great Northern and the Chicago, Burlington & Quincy, not exceeding the rates from the same points to Minneapolis over the Great Northern. The commission found that the rates on grain from the points of origin in question to Omaha were at least 9.1 cents per 100 lbs. higher than to Minneapolis. The commission decided that a through route and joint rate should be established from stations on the Great Northern, Great Falls-Billings line, Hesper to Spion Kop, inclusive, not higher than the rates from the same points to Minneapolis via the Great Northern. As the Great Northern could secure a longer haul by establishing a through route and joint rates to Omaha via Sioux City, that company may apply for an amended order, although the latter route is considerably longer than the route via Billings.

The complainant also seeks the establishment of a through route and joint rate via Billings and Omaha to Chicago with transit privileges at Omaha, which shall not exceed the through rate from the same points of origin to Chicago via Minneapolis, with transit privileges at Minneapolis. The commission denied this prayer. (26 I. C. C., 553.)

Axle Grease Rate.

Marshall Oil Company v. Chicago & North Western et al. Opinion by the commission:

The defendants permit the shipment in mixed carloads at carload rates of practically all products of petroleum except axle grease. The complainant contends that the exclusion of axle grease from the mixed carload privilege is unreasonable. The commission decided that the provision of the defendants' tariffs excluding axle grease from the products of petroleum that may be transported in mixed carloads at carload rates, while similar products are given this privilege, resulted in discrimination and ordered the defendants to remove this discrimination. (26 I. C. C., 575).

Rate on Common Brick Reduced.

Collingwood Brick Company et al. v. Pere Marquette. Opinion by the commission:

In this case the complainant contends that the rate of 70 cents per ton on common brick between Toledo and Detroit is unreasonable to the extent that it exceeds 60 cents per ton, the rate in effect prior to May 21, 1911. The commission decided that the present rate was unreasonable, and ordered that in future the rate of 60 cents per ton should apply. (26 I. C. C., 572.)

Rate on Butchers' Blocks Reduced.

National Refrigerator & Butchers' Supply Company v. St. Louis, Iron Mountain & Southern et al. Opinion by the commission:

The complainant contends that the rate of 43 cents per 100 lbs., for the transportation of butchers' blocks in less than carload lots from Whitewater, Mo., to Memphis, Tenn., is unreasonable to the extent that it exceeds the rate from St. Louis, Mo., to Memphis; also that this rate was in conflict with the fourth section in that it exceeded the rate from Whitewater to New Orleans, La. The defendants tried to justify this violation of the fourth section on the ground that the lower rate from St. Louis was forced by water competition; also that Whitewater was nearer the source of raw material. The commission found that on traffic to New Orleans Whitewater was accorded the same rate as St. Louis. The commission decided that the rate charged the complainant on its shipments from Whitewater to Memphis was unreasonable to the extent that it exceeded the rate from St. Louis to Memphis, and prescribed that rate for the future. Reparation was awarded. The application of the defendants for relief from the fourth section on this traffic was denied.

The complainant also contends that the rate of 49½ cents per 100 lbs., for the transportation of butchers' blocks in less than carloads from New Memphis, Ill., to Memphis, Tenn., was unreasonable to the extent that it exceeded a rate of 30 cents per 100 lbs. The commission found that no through rate was applicable to the shipments and that the lowest combination of intermediate rates was 39.1 per 100 lbs. The commission decided that there had been an overcharge on these shipments, but that the rate of 39.1 cents per 100 lbs. should not be changed. The complainant contends that the defendants violated the fourth section of the act by charging a rate of 30 cents per 100 lbs., for the transportation of butchers' blocks to Memphis from St. Louis, Bellville and Nashville. The commission decided that the rate complained of was not unreasonable and that the defendants were justified in violating the fourth section because of water competition at St. Louis and rail competition at Bellville and Nashville. The defendants were ordered to refund the overcharge on the shipment from New Memphis, Ill., to Memphis, Tenn. (26 I. C. C., 525.)

Rates on Grain Not Changed.

Board of Trade of the City of Chicago v. Illinois Central. Opinion by Chairman Clark:

There is an established relation between the rates on grain in carloads from Omaha, Neb., to Chicago and the rates on the same commodity from Omaha to New Orleans, La., for export. In 1912 the Omaha-New Orleans rate was reduced, but subsequently restored, without any change in the Omaha-Chicago rate. During the existence of the reduced rates to New Orleans, a complaint was filed alleging that the resulting adjustment was discriminatory against Chicago in favor of New Orleans, and

also that the rates from Omaha to Chicago were unreasonable in themselves. The commission decided that the restoration of the old rate from Omaha to New Orleans had removed the discrimination complained of, and also that the rates from Omaha to Chicago were not shown to be unreasonable in themselves.

The complainant also urged the commission to determine what would be a reasonable rate from Omaha to Chicago as compared with rates from Omaha to New Orleans, should the latter again be reduced. The commission decided that in this case where only one carrier operating over only a part of the through route to the Atlantic ports was defendant, it could not determine the question of differentials in a general adjustment of rates. The commission decided further that if the rate from Omaha to New Orleans were again reduced it could be suspended pending investigation. (26 I. C. C., 545.)

Transfer of Shipment Permitted.

Dubuque Shippers' Association v. Chicago & North Western et al. Opinion by the commission:

The complainant requests the commission to require the defendants to forward a carload of package freight, originating each day at Dubuque, Ia., without transfer at Galena, Ill., to destinations on the line of the Chicago & North Western in Wisconsin. For several years a merchandise car of less than carload shipments, destined to points on the Chicago & North Western, between Galena and Madison and Woodman, has been loaded each day by the Illinois Central at Dubuque, and moved over that company's line to Galena, where it was accepted by the Chicago & North Western just as received and immediately forwarded to the destinations. Recently the Chicago & North Western has refused to forward the car as received from the Illinois Central and insists on transferring the packages and rearranging them in its own cars at Galena, which results in a delay of from 24 to 48 hours. The Dubuque shippers compete with shippers at other points, so this delay constitutes an important factor in the competition. The defendant's reasons for not accepting the Dubuque car without transfer are the large number of claims for shortage and damage to consignments; the presence of packages for which there was no billing; bad billing; lack of checking at Galena; and indiscriminate loading instead of station order loading, resulting in delays to the train. The commission found that a carrier should not be required to accept a carload of miscellaneous freight from another without checking the contents, so as to discover the quantity and kind of goods for which it becomes responsible. Neither should the defendant be denied the right of transferring the packages to other cars, so as to arrange them in convenient order for delivery. The complaint was dismissed. (26 I. C. C., 565.)

STATE COMMISSIONS.

The South Dakota Railroad Commission has asked railways in the state to file a statement showing the salaries paid to officers.

The Illinois Railroad and Warehouse Commission has entered an order allowing an increase in the switching rates on coal in the Chicago district by the Chicago, Milwaukee & St. Paul, but the commission holds that other roads must not increase their coal rates on this account to exceed the rates allowed by the commission in August, 1911.

The Illinois railroad and warehouse commission has ordered the Chicago & Alton to stop its Chicago-St. Louis fast trains at East St. Louis. Heretofore many of the trains have been entering and leaving St. Louis by the Merchants' bridge, thus avoiding the city of East St. Louis. It is said that the East St. Louis Commercial Club will seek another order directing other roads to stop their eastbound trains from St. Louis at East St. Louis.

COURT NEWS.

In the United States court at Boston, April 16, a fine of \$5,000 was imposed on the New York, New Haven & Hartford for granting illegal concessions in the price of transportation of milk from certain points in Connecticut to Boston.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF FEBRUARY, 1913.

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses			Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.	
		Freight.		Passenger.	Total, inc. misc. structures, equipment.	Traffic.	Trans- portation.						
Alabama Great Southern.....	309	\$289,796	\$95,292	\$420,799	\$97,578	\$46,859	\$12,825	\$140,426	\$111,922	-\$540	\$14,477	\$96,905	\$2,143
Cincinnati, New Orleans & Texas Pacific.	337	752,706	155,015	948,749	78,067	194,084	23,044	269,740	585,208	-1,161	29,000	333,380	128,647
Georgia	307	175,147	61,210	255,814	46,945	5,437	10,633	126,482	197,647	.....	2,950	55,217	6,634
Hocking Valley	351 ¹	403,917	59,530	497,614	46,702	118,089	8,681	174,670	360,742	.....	37,500	99,372	-76,413
New Orleans, Mobile & Chicago.....	547 ²	155,255	24,422	191,025	26,707	36,231	4,369	92,828	168,757	-178	7,405	14,685	-35,031
Oahu Railway & Land Co.....	101 ³	60,307	23,077	89,879	7,848	5,333	662	21,279	50,353	-5,264	6,500	38,589	3,241
Ulster & Delaware.....	129	49,578	13,360	65,960	6,101	12,172	1,125	34,801	9,176	83	3,300	5,959	12,966
Wabash	2,515	1,621,166	450,323	2,295,952	237,661	373,460	78,807	1,184,562	360,626	-7,926	78,949	273,751	143,107
Western Maryland	543	506,943	56,789	576,896	54,190	84,373	16,073	291,931	116,298	.....	20,000	96,298	-67,798
EIGHT MONTHS OF FISCAL YEAR, 1913.													
Alabama Great Southern.....	309	\$2,294,454	\$894,860	\$3,489,949	\$403,305	\$759,412	\$102,715	\$1,099,333	\$1,047,970	-\$4,296	\$117,312	\$926,362	\$66,204
Cincinnati, New Orleans & Texas Pacific.	337	5,426,670	1,290,627	7,061,049	673,087	1,581,725	184,439	1,981,012	2,486,162	-5,870	229,600	2,250,692	210,160
Georgia	307	1,334,795	602,323	2,085,814	234,837	408,863	92,495	1,044,222	239,596	.....	23,879	215,717	-422,950
Hocking Valley	351 ¹	4,232,715	638,420	5,207,394	520,827	1,062,629	71,047	1,537,149	1,904,390	.....	312,600	1,591,790	-18,060
New Orleans, Mobile & Chicago.....	547 ²	1,329,977	241,119	1,670,394	270,518	176,124	28,409	621,617	507,836	-641	39,832	467,363	27,951
Oahu Railway & Land Co.....	101 ³	545,039	181,723	777,825	71,691	48,884	4,788	166,923	449,100	15,747	49,016	415,831	50,898
Ulster & Delaware.....	129	452,371	272,971	763,394	100,248	103,028	10,426	318,258	210,842	584	26,400	185,026	2,784
Wabash	2,515	14,806,892	4,980,014	21,634,862	2,707,883	3,617,931	683,567	8,897,541	5,210,375	-35,735	587,329	4,587,311	579,899
Western Maryland	543	4,100,257	672,592	5,018,334	742,056	711,359	125,828	2,150,107	1,180,958	.....	160,000	1,020,958	-498,767

Average mileage operated during previous period—1 352; 2 404; 3 99. — Indicates Deficits, Losses and Decreases.

Average mileage operated during previous period—1 352; 2 404; 3 99. — Indicates Deficits, Losses and Decreases.

Railway Officers.

Executive, Financial and Legal Officers.

C. S. Sikes, auditor of traffic accounts of the Pere Marquette, has been appointed auditor, with headquarters at Detroit, Mich. During the absence of the comptroller, his duties will be performed by Mr. Sikes.

W. L. Maury, who has been auditor of the International & Great Northern since 1888, has been appointed consulting auditor, a newly created office. W. J. Werner, assistant auditor, succeeds Mr. Maury as auditor, with headquarters at Houston, Tex., and the former position is abolished.

Operating Officers.

George F. Dickson, trainmaster of the Georgia & Florida, at Douglas, Ga., has been appointed superintendent, with office at Douglas, succeeding D. F. Kirkland, resigned to accept service with another company.

J. J. Breheny, trainmaster of the Colorado division of the Chicago, Rock Island & Pacific, has been appointed trainmaster of the Kansas division, with headquarters at Herington, Kan., in place of C. I. Kerr, deceased.

The headquarters of the following officers of the Long Island Railroad have been transferred from Long Island City, N. Y., to Jamaica: H. W. Thornton, general superintendent; J. B. Austin, Jr., superintendent; W. L. Jarvis, steam passenger trainmaster; H. E. Lewis, chief despatcher; J. M. McGee, assistant trainmaster, and R. W. Farrell, superintendent of station service.

A. G. Wells, general manager of the Atchison, Topeka & Santa Fe Coast Lines, has been granted a six months' leave of absence, and I. L. Hibbard has been appointed acting general manager, with headquarters at Los Angeles, Cal. J. R. Hitchcock, superintendent of the Los Angeles division at Los Angeles, Cal., has been appointed acting general superintendent, with office at Los Angeles, in place of I. L. Hibbard. J. B. Galivan, trainmaster at San Bernardino, Cal., succeeds Mr. Hitchcock as acting superintendent of the Los Angeles division. A. R. Woods has been appointed acting trainmaster of the Second district, Albuquerque division, with office at Winslow, Ariz., in place of E. E. McCarty, who has been appointed acting trainmaster at San Bernardino in place of Mr. Galivan.

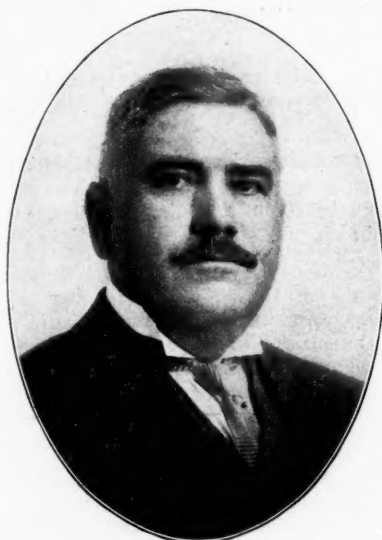
Ira L. Burlingame, who on April 14, was made general manager of the Terminal Railroad Association of St. Louis, as has already been announced, was born September 6, 1862, at Frank-



I. L. Burlingame.

linville, N. Y., and was educated at Ten Broek Academy. He entered railway service in 1879 as a telegraph operator for the Ohio & Mississippi, and from 1883 to 1895 was a train despatcher on that road. He was then for nine years trainmaster of the Baltimore & Ohio Southwestern, and in December, 1903, left that road to go with the Terminal Railroad Association of St. Louis as assistant superintendent. He was superintendent of that association from March, 1904, to November, 1905, and on the latter date became general superintendent, from which position he is now promoted to that of general manager, as above noted. Mr. Burlingame assumes part of the duties heretofore performed by President and General Manager W. S. McChesney, Jr., who relinquished the duties of general manager, and recommended the election of Mr. Burlingame to that position.

Edward James Gibson, whose appointment as superintendent of the Iowa division of the Rock Island Lines, with headquarters at Des Moines, Iowa, has been announced, was born

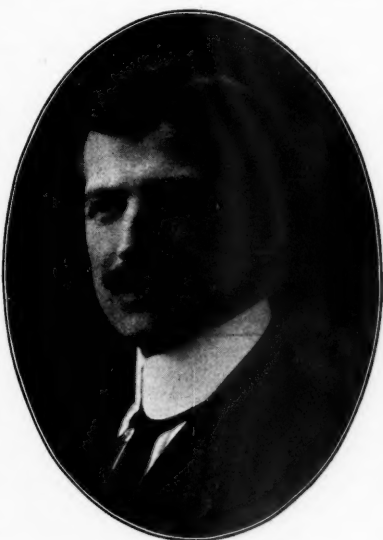


E. J. Gibson.

February 9, 1865, in Perry county, Indiana. He received a common school education, and began railway work in 1878, with the St. Louis, Kansas City & Northern, now the Wabash, as a telegraph operator. From 1880 to 1886 he was agent for the Missouri, Kansas & Texas, and the following three years was train despatcher on the Fremont, Elkhorn & Missouri Valley. Mr. Gibson went with the Atchison, Topeka & Santa Fe in April, 1889, with which road he remained until April 3, of this year, when he resigned to become superintendent of the Iowa division of the

Rock Island Lines, as above noted. While with the Santa Fe he was train despatcher, chief train despatcher and superintendent, having been in Mexico on the Sonora road five years, from 1896 to 1901, when that road was owned by the Santa Fe. His last position was that of superintendent of the Albuquerque division, with headquarters at Winslow, Ariz.

Frederick J. Hawn, who recently became superintendent of the Fort Worth division of the St. Louis Southwestern, and superintendent of the Dallas Terminal & Union Depot Company, with headquarters at Mt. Pleasant, Tex., was born June 15, 1863, at Stevens Point, Wis. He was educated in the public schools and began railway work in 1877, with the Wisconsin Central. He remained with that road until September, 1898, serving in many capacities, including call boy to chief despatcher, some years in the mechanical department, and as brakeman and conductor, until September, 1894. He was then appointed trainmaster, leaving the Wisconsin Central in 1898 to go with the Great Northern. On the latter road he was successively assistant superintendent of the Cascade and Montana divisions, and superintendent of the Breckenridge division. Mr. Hawn became connected with the St. Louis Southwestern in 1903, and was made superintendent of transportation, with headquarters at Tyler, Tex., on February 17, 1907, which position he held until his recent appointment as superintendent of the Fort Worth division, as above noted.



F. J. Hawn.

Traffic Officers.

Opie Reid has been appointed traveling freight agent of the Rock Island Lines, with headquarters at Lake Charles, La.

T. Kight has been appointed traveling freight agent of the Gulf, Colorado & Santa Fe, with headquarters at San Antonio, Tex.

W. E. Robinson has been appointed freight solicitor of the

Star Union Line at Indianapolis, Ind., in place of Volney E. Huff, promoted.

John J. Morton has been appointed acting assistant import freight agent of the Canadian Pacific, with office at Chicago, effective May 1.

G. S. Hinkins has been appointed freight soliciting agent of the Southern, with office at Huntsville, Ala., succeeding G. W. Lewis, transferred.

C. A. Lindsey, formerly assistant general passenger agent of the Colorado & Southern, has been appointed city passenger agent of the Denver, Boulder & Western at Denver, Colo.

R. F. Fox has been appointed traveling passenger agent of the Colorado & Southern, with headquarters at Denver, Colo., succeeding W. T. Spicer, resigned to go with the Missouri, Kansas & Texas at Dallas, Tex.

J. I. Hazzard, formerly general agent of the El Paso & Southwestern System at St. Louis, Mo., has been appointed general western agent of the Western Maryland at Chicago, succeeding John S. Talbot, resigned.

C. J. Helber, traveling passenger agent of the Wabash, with headquarters at Denver, Col., has been appointed general agent at that place, succeeding J. D. Lund, who has been transferred to Cincinnati, Ohio, as commercial agent in place of George A. Rump, deceased.

J. R. L. Wulff, commercial agent of the Southern at Omaha, Neb., has been transferred to Kansas City, Mo., in a similar capacity in place of P. J. Tapp, deceased. C. M. Ross, assistant chief clerk in office of general freight agent at Memphis, Tenn., has been appointed traveling freight agent, with headquarters at Kansas City, succeeding C. M. Agnew, promoted.

Engineering and Rolling Stock Officers.

R. R. Black has been appointed roadmaster of the Atchison, Topeka & Santa Fe at Rincon, N. M., in place of C. L. McCallister.

L. C. Maxwell has been appointed engineer maintenance of way of the Algoma Central & Hudson Bay, with office at Sault Ste. Marie, Ont.

W. S. Basinger has been appointed division engineer of the Southern Kansas division of the Atchison, Topeka & Santa Fe at Chanute, Kan.

W. D. Manchester has been appointed chief engineer of the Manistee & North Eastern, with headquarters at Manistee, Mich., succeeding J. J. Hubbell, deceased.

T. R. McLeod, master mechanic of the Halifax & Southwestern at Bridgewater, N. S., has been appointed master mechanic of the Canadian Northern Ontario, with headquarters at Parry Sound, Ont., succeeding C. L. Webster, resigned.

W. H. Alderson, heretofore chief draftsman in the bridge department of the consulting engineer's office of the Union Pacific and Southern Pacific in New York, has been appointed bridge engineer of the Oregon-Washington Railroad & Navigation Company, with headquarters at Portland, Ore., effective April 23.

R. J. Gatewood, division engineer of the Atchison, Topeka & Santa Fe at San Marcial, N. M., has been transferred to the New Mexico division in a similar capacity, with headquarters at Las Vegas, N. M., succeeding T. A. Williams. W. J. Lank, division engineer of the Pecos division, with office at Clovis, N. M., succeeds Mr. Gatewood, and J. W. Walter has been appointed acting division engineer of the Pecos division in place of Mr. Lank.

Samuel Lenzner, who has been appointed master car builder of the Michigan Central, with headquarters at Detroit, Mich., as has been announced in these columns, was born June 30, 1861, at Lancaster, N. Y. He has been with the Michigan Central since July 12, 1886, when he began railway work as a coach carpenter. In September, 1889, he was made foreman of the cabinet department, and in March, 1909, was advanced to general foreman of the car department, which position he held until his recent promotion on April 1, to master car builder, as above noted.

F. L. Thompson, who, on April 1, was appointed engineer of construction of the Illinois Central, as has already been announced, was graduated from the University of Illinois in civil engineering, with the degree of B. S., in 1896. He entered the service of the Illinois Central June 18 of that year as chairman on the reconstruction and lowering of the tracks on the lake front in Chicago, and later was made rodman and inspector on the concrete work. From February of the following year to February, 1898, he was rodman at Vicksburg, Miss., on the work of removing a 700-ft. tunnel and making it an open cut and had charge of a concrete arch and building of a large freight house. He was then until January, 1900, rodman and assistant engineer on surveys and on grade reduction work, Fulton to Memphis, and from the latter date to August, 1901, assistant engineer in charge of grade reduction and double track work, Wickliffe to Fulton, Ky. He was subsequently for six months in charge of double track and grade reduction work from Irvington to Carbondale, Ill., and from February, 1902, to February, 1903, was assistant engineer in the chief engineer's office at Chicago. The following eight months he was acting roadmaster of the Chicago division, being transferred to the Louisville division as roadmaster in October, 1903, and remaining in that capacity until January, 1907, when he was made assistant engineer of bridges. On July 1, 1910, he was promoted to engineer of bridges and buildings, which position he held until his recent appointment as engineer of construction, as above noted.



F. L. Thompson.

OBITUARY.

Jeremiah J. Coakley, superintendent of the Terminal Railroad Association of St. Louis, and the St. Louis Merchants' Bridge Terminal Railway, died in St. Louis, Mo., on April 21, aged 54 years. He had been with the Terminal association for 35 years.

Frank D. Tracy, real estate and tax agent of the Chicago & Alton, died suddenly in Chicago on April 18, aged 71 years. Mr. Tracy had been connected with the Chicago & Alton for 40 years.

Henry C. Dickson, traveling passenger agent of the Delaware, Lackawanna & Western, with headquarters at Chicago, died suddenly in that city on April 16, aged 50 years.

MILEAGE OF THE BUENOS AYRES GREAT SOUTHERN, ARGENTINA.—The average number of miles of line operated during the last half of the calendar year of 1912, including the lines operated under agreement, were 3,510 miles, compared with 3,343 miles for the corresponding period of 1911.

RAILWAY MILEAGE IN URUGUAY.—The total length of the standard gage lines in Uruguay is 1,533 miles, of which 1,031 miles are under state guarantee. The operation of the guaranteed railways during 1912 has resulted favorably and the outlook for the future is also promising. During 1912, 56 miles of new line were added to the mileage of guaranteed railways. The net profits of the year were \$1,221,622 compared with \$1,082,728 in 1911. The guarantees paid by the state amounted to \$720,737 or \$622,827 less than the full amount for which it holds itself responsible. The gross receipts of all the railways amounted to \$6,526,697, of which passenger traffic contributed \$1,808,166, freight \$4,262,867, and miscellaneous and baggage \$454,664. Operating expenses amounted to \$3,715,379, leaving a net profit of \$2,811,318.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE SEABOARD AIR LINE is understood to have placed its order for locomotives. Details will not be available for several days.

BERTRON, GRISCOM & COMPANY have ordered one consolidation locomotive from the American Locomotive Company. The dimensions of the cylinders will be 20 in. x 24 in., the diameter of the driving wheels will be 52 in., and the total weight in working order will be 138,000 lbs.

THE TAUPU TOTARA TIMBER COMPANY, of Australia, has ordered one Mallet (2-4-4-2) locomotive from the American Locomotive Company. The dimensions of the cylinders will be 10 in. x 16 in. x 23 in., the diameter of the driving wheels will be 32 in., and the total weight in working order will be 66,000 lbs.

THE IMPERIAL TAIWAN RAILWAY, Formosa, has ordered one Pacific type locomotive from the American Locomotive Company. The dimensions of the cylinders will be 18½ in. x 24 in., the diameter of the driving wheels will be 63 in., and the total weight in working order will be 137,000 lbs. This locomotive will be equipped with a superheater.

CAR BUILDING.

THE MISSOURI PACIFIC is in the market for 1,000 forty-ton stocks cars.

THE HARRIMAN LINES have ordered 201 passenger cars from the Pullman Company.

THE NORTHERN PACIFIC has ordered 12 postal cars from the Pressed Steel Car Company.

THE BALTIMORE & OHIO is expected to place an order for 72 passenger cars immediately.

THE ILLINOIS CENTRAL has ordered 800 furniture cars, 500 refrigerator cars and 500 stock cars from the American Car & Foundry Company.

THE GRAND TRUNK has ordered 1,000 additional box cars from the Pressed Steel Car Company, and has ordered 3,000 freight cars from the Canadian Car & Foundry Company.

THE SEABOARD AIR LINE has ordered 500 box cars from the Pressed Steel Car Company, 250 flat cars from the American Car & Foundry Company and 250 hopper cars from the Standard Steel Car Company.

IRON AND STEEL.

GENERAL CONDITIONS OF STEEL.—The volume of orders in the steel industry continues to be light but specifications are heavy and the mills are operating at as near their full capacity as possible. The Steel Corporation has enough orders on its books to keep its mills operating at full capacity until about November 1. The corporation is having difficulty in producing sufficient billets for its own consumption and has recently had to buy nearly 50,000 tons of billets in the open market. Prices are high and there is no prospect of any change in the immediate future. The contracts which are being filled at the present time were booked at current prices, so the earnings from now on should be larger. It is estimated that the earnings of the Steel Corporation for the first quarter will be in the neighborhood of \$37,000,000, compared with \$17,826,973 earned in the first quarter of 1912. The flood will not seriously affect the earnings of the steel companies, as the loss in production will be offset to a large extent by the new orders for replacement.

NEW LINE FOR INDIA.—The frontier 2-ft. 6-in. railway on the right bank of the Indus will shortly be opened from Bassnu to Kalabagh, and is being extended to Tank.

Supply Trade News.

The Grip Nut Company is moving its Chicago office from the Old Colony building to 661-663 McCormick building.

Westinghouse, Church, Kerr & Company, New York, has moved its general offices from 10 Bridge street to 37 Wall street.

The National Railway Equipment Company, Chicago, has moved its offices from the McCormick building to 661 People's Gas building.

The Union Spring & Manufacturing Company, Pittsburgh, Pa., has moved its New York office from 149 Broadway to 50 Church street.

W. F. Hebard has been appointed district sales agent for the electric truck department of the Buda Company and for the Canton Culvert Company, with headquarters at 1200 Karpen building, Chicago.

J. J. Hubbard has been made resident manager of the Federal Signal Company, Albany, N. Y., with office in New York, and J. W. Hackett has been made sales engineer of the same company, with office in New York.

Edward C. Meeker, assistant eastern purchasing agent of the Pullman Company, Chicago, with office in New York, died at his home in Brooklyn, N. Y., on April 19, at the age of 47. Mr. Meeker had been with the company for 30 years.

Andrew Thompson, general manager of the Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., will hereafter have charge of the sales of that company. A. C. Hawley has been made representative of the company for the Pittsburgh district, with office in Pittsburgh, Pa.

The Davis-Bournonville Company, New York, maker of oxy-acetylene welding and cutting apparatus, has moved its general offices from the West Street building, New York, to its demonstration plant at Marion Station, Jersey City, N. J., and has moved its New York office to the Hudson Terminal building, 30 Church street. The Chicago office of the company has also been moved from 515 Laflin street to the Monadnock block.

TRADE PUBLICATIONS.

BORING HEADS.—Marvin & Casler Company, Canastota, N. Y., has published an illustrated booklet describing its Offset boring heads.

VENTILATORS.—The Gold Car Heating & Lighting Company, New York, has published a small illustrated folder describing its curtain window ventilators, which are designed to give fresh air without draughts.

CLEANING LOCOMOTIVE ARCH TUBES.—The Lagonda Manufacturing Company, Springfield, Ohio, has published a brief illustrated folder describing its special devices for cleaning locomotive arch tubes by air and steam.

HEADLIGHTS.—The General Electric Company, Schenectady, N. Y., has devoted bulletin No. A-4061 to illustrations and descriptions of its electric arc headlights. This bulletin supersedes this company's previous bulletin on this subject.

WATTHOUR METERS.—The Sangamo Electric Company, Springfield, Ill., has devoted bulletin No. 35 to its type D and D-4 direct current watthour meters. This bulletin is very thorough in its descriptions and illustrations of these meters. Prices are included.

BANGOR & AROOSTOOK.—The passenger department has issued an illustrated booklet of 160 pages, entitled "In the Maine Woods." The booklet is devoted to the hunting, fishing and camping in the region, and also includes a section devoted to the agricultural possibilities of Maine.

MOTOR CARS.—Mudge & Company, Chicago, has issued an unusually attractive catalogue, No. 101, describing and illustrating inspection motor cars, section motor cars, the Au-Tra-Kar, and railroad motor car accessories. The catalogue contains unusually clear illustrations and specifications, together with descriptions of the service given by various types of cars.

Railway Construction.

BALTIMORE & OHIO.—This company has recently given contracts for building a 11 mile low grade double-track line to be known as the Magnolia cut-off between Orleans Road, W. Va., and Little Cacapon, on the east end of the Cumberland division. The improvement will cost about \$6,000,000, and owing to the heavy character of construction the work will be extended over a period of about two years. The work is to be divided into eight sections, and contracts have been let as follows: Sections 2, 3 and 4 to H. S. Kerbaugh, Inc., New York; sections 5 and 7 to Bennett & Talbot, Greensburg, Pa., and section 6 to Smith, McCormick Company, Easton, Pa. Contracts for sections 1 and 8 have not yet been let. The work includes piercing a tunnel about 3,000 ft. long, with three smaller tunnels. The construction of the new line will involve several changes in the present double-track line and between Orleans Road and the present location of Doe Gully tunnel, which is to be eliminated and converted into an open cut, the old line will be raised to make a four-track line. Between Doe Gully and Hansrote the present line will be relocated to eliminate curves. The old line will also be relocated to some extent at Paw Paw.

BRUCE MINES & ALGOMA.—See Lake Huron & Northern Ontario.

CHARLESTON, PARKERSBURG & NORTHERN.—An officer writes that contracts will be let during the next three months to build from Parkersburg, W. Va., south via Rockport, Sandyville, Ripley, Fairplain, Kenna, Sissonville, and Guthrie to Charleston, about 75 miles. Maximum grades will be 2 per cent., and maximum curvature 6 deg. There will be five 60 ft. girder bridges, also five trestles 2,000 ft. long, with an average height of 30 ft., and five trestles to have a total length of 5,500 ft. The company will use gasolene motor cars for passenger traffic. K. B. Stephenson, president, and R. R. Cutler, engineer, Citizens Trust & Guaranty building, Parkersburg.

CHICAGO, MILWAUKEE & ST. PAUL.—The Puget Sound & Willapa Harbor has been incorporated in the state of Washington with \$2,500,000 capital, to build from Helsing Junction, Wash., southwest to Raymond on Willapa harbor, 47 miles.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—Double track between Greenwood, Ky., and Cumberland Falls, 4.44 miles, has just been put-in service, making a total of 87.41 miles of double track now in operation on this road. Second track is now being constructed between Erlanger, Ky., and Williamstown, 29.6 miles, and work is about finished on 2 miles between Citico, Tenn., and Boyce. (June 21, p. 1589.)

GREAT NORTHERN.—A contract has been given to Grant Smith & Co., it is said, to pierce a 1,200 ft. tunnel through the Cascade mountains in the state of Washington.

GRAND TRUNK PACIFIC.—According to press reports, a contract has been given to T. Daly, Montreal, Que., by the general contractors of the section of the National Transcontinental from Levis, Que., to the New Brunswick boundary for the completion of that section.

GULF, TEXAS & WESTERN.—An officer writes regarding the report than an extension is to be built from Seymour, Tex., west, that the company contemplates such an extension, but has not yet decided when the work will be carried out. (April 4, p. 821.)

HOUSTON & TEXAS CENTRAL.—Work will soon be begun, it is said, on an extension from Llano, Tex., northwest to Brady, about 60 miles.

INTERMARINE RAILWAY & NAVIGATION COMPANY.—The Manitoba legislature has authorized the construction of this line. The projected route is from a point near the head of Lake Winnipeg northeasterly for 122 miles to a junction with the Dominion government railway to Hudson Bay at mile 191 from Pas, Manitoba. The provisional directors include W. J. Robertson, P. J. Gordon, W. D. Boyd, K. Clemes, C. F. Just, Winnipeg, Man.

LAKE HURON & NORTHERN ONTARIO.—This is the new name of the Bruce Mines & Algoma, which built a 17-mile line from

Bruce Mines, Ont., on Lake Huron north to Rock Lake. A bill is before the Ontario legislature permitting the new company to buy land, and to build an extension. The plans call for a line having a total length of 325 miles. M. J. O'Brien, Pembroke, Ont.; W. H. Hewing, Montreal, Que.; J. J. Gartshore, Toronto, Ont.; H. A. Appleton and G. P. McCallum, Sault Ste. Marie, Mich., are back of the project.

LAKE WINNIPEG & NELSON RIVER.—Incorporated in Manitoba to build from Township 48, range 14, west 1st meridian, northeasterly to Township 56, range 11, thence northerly to the south of Burntwood lake, with branches to the Nelson river, in Township 62, range 2; in Township 72, range 1, and Township 68, range 5. The provisional directors include J. B. Henderson, G. G. Lennox, H. G. Holman, J. E. Kyle, J. Scott, Winnipeg, Man.

LEHIGH VALLEY.—Bids have been asked for building an extension of the Seneca Falls branch from Seneca Falls, N. Y., east to Cayuga Junction.

LOMAX TERMINAL.—Incorporated in Illinois, with \$25,000 capital and office at Lomax. The company plans to build from Nauvoo, Hancock county, northeast to Stronghurst, Henderson county, about 30 miles. The incorporators include W. T. Love, J. F. Smith, H. W. Beardsley, C. H. Kisner and L. O. Beardsley, all of Lomax.

NEW YORK CONNECTING.—The contract for the towers above the bases of the Hell Gate arch bridge at New York, has been let to Snare & Triest, New York City.

PUGET SOUND & WILLAPA HARBOR.—See Chicago, Milwaukee & St. Paul.

SOUTHWESTERN OF ALABAMA.—An officer writes that the plans call for building from Montgomery, Ala., southwest via Hayneville, Snow Hill and Camden to River Ridge, about 107 miles. It is undecided when contracts to build the line will be let. About 12 miles of track has been laid. W. S. Richardson, Montgomery, is president.

TEXAS ROADS.—Plans are being made by Jesse Gandy, Broken Bow, Neb., and associates, it is said, to build from San Antonio, Tex., southeast via Mathis and to Aransas Pass, about 150 miles.

VIRGINIA-CAROLINA.—According to press reports work is now under way on a 9-mile extension. The road is now in operation from Abingdon, Va., east via Damascus to Konnarock, 31 miles. It is expected that the company will ask for bids soon, for work on an additional 45 miles south toward Boone, N. C. The line may be eventually extended further south to Blowing Rock.

RAILWAY STRUCTURES.

ALTOONA, WIS.—The Chicago, St. Paul, Minneapolis & Omaha has begun work on a new 32-stall roundhouse, machine shops and other improvements.

BEAUMONT, TEX.—The Texas & New Orleans has begun work on new machine shop buildings and other improvements, to cost about \$40,000.

FAYETTEVILLE, N. C.—The Atlantic Coast Line will build a steel bridge, it is said, over the Cape Fear river near the present single-track bridge. Contract is reported let for the concrete work to W. Z. Williams & Co.

LEXINGTON, KY.—According to press reports the Louisville & Nashville will build a freight house, and is making plans for putting up a roundhouse, shops, etc., in Lexington.

MICHIGAN CITY, IND.—The Chicago, Indianapolis & Louisville has prepared plans for improved terminal facilities, including a new passenger station and a new freight house.

NEW YORK.—See New York Connecting under Railway Construction.

SOMERSET, KY.—Important improvements in the Ferguson shops near Somerset, Ky., are to be made by the Cincinnati, New Orleans & Texas Pacific. The work includes an extension to the shop building, additional storehouse and repair track capacity, and the installation of a number of modern appliances.

Railway Financial News

MERIDIAN & MEMPHIS.—This company, which is building a line from Meridian, Miss., to Union—40 miles, and has 10 miles completed, has made a mortgage securing an issue of \$800,000, 30 year, 5 per cent. bonds.

MISSOURI, KANSAS & TEXAS.—Speyer & Co., New York, are offering \$19,000,000 two year 5 per cent. secured notes dated May 1, 1913, at 98 yielding 6½ per cent. on the investment. This is part of a total authorized issue of \$25,000,000. The \$19,000,000 notes are issued now against deposit of \$24,516,000, Missouri, Kansas & Texas consolidated mortgage 5 per cent. bonds of 1910-1940, the issue of which has been authorized by the public utilities commissions of Kansas and Missouri. The proceeds of these \$19,000,000 notes are to be used to retire \$17,500,000 5 per cent. notes maturing May 1, 1913, and for other corporate purposes. The remaining \$6,000,000 notes are reserved for issue against the deposit of an additional amount of consolidated mortgage bonds, taken at 77½ per cent. The average annual surplus of the Missouri, Kansas & Texas Railway System for the five fiscal years ending June 30, 1912, after providing for all fixed charges, taxes, rentals, etc., amounted to \$1,108,381. For the eight months ended February 28, 1913, the surplus of the Missouri, Kansas & Texas, after providing for all fixed charges, taxes, rentals, etc., was \$2,693,120, an increase of \$2,321,367.50 over the same period of the previous year. From July 1, 1912, to March 31, 1913, the operating revenues (partly estimated) of the system amounted to \$25,251,139.84, an increase of \$3,239,461 over the same period of the previous year.

NEW YORK CENTRAL & HUDSON RIVER.—J. P. Morgan has been elected a director, to succeed his father, J. P. Morgan, deceased.

NEW YORK, NEW HAVEN & HARTFORD.—J. P. Morgan has been elected a director to succeed his father, J. P. Morgan, deceased.

SEABOARD AIR LINE.—The *Commercial Financial Chronicle* says that negotiations are pending for the purchase by the Seaboard Air Line of the North & South Carolina. The North & South Carolina runs from Hamlet, N. C., to Georgetown Junction, S. C., 79 miles.

SOUTHERN PACIFIC.—Of the \$10,120,000 equipment trust certificates, the issue of which has been approved by the California Railroad Commission, \$5,000,000 are to be sold in the near future. Kuhn, Loeb & Company, New York, have underwritten these notes.

See new plan for sale of Southern Pacific stock by Union Pacific in General News.

UNION PACIFIC.—See new plan for sale of Southern Pacific stock in General News.

BAGHDAD RAILWAY, ASIA MINOR.—After having come to a full stop for so many years at the end of its first 124-mile section, the Baghdad Railway is now beginning to make rather good progress. From the engineering standpoint, the most difficult part of the scheme is the construction of the line across the Taurus Range, and although the actual mountain section is not yet in hand, a good deal of approach work on each side has already been finished. On the southern side, the approaches include the little railway from Mersina to Adana, via Tarsus which has now been incorporated in the Baghdad undertaking. The works are already so far advanced that on the completion of the Taurus mountain section and the bridging of a short gap to the west, through railway communication will be given from Scutari to the Holy Land, via Aleppo and Damascus. Advantage is being taken of the section already open to shorten the journey between Baghdad and the Syrian coast, motor-boats having now been placed on the Euphrates to run to and from the present railway terminus. This has led to the shortening of the journey between Baghdad and the coast by one-half, the time being eight and a half as against the former 17 days.